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OTOLOGY AND LARYNGOLOGY.

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## CHRONIC SUPPURATIVE INFLAMMATION OF THE LEFT MIDDLE EAR—ACUTE SUPPURA- TIVE INFLAMMATION OF THE RIGHT MID- DLE EAR—DEATH FROM PURULENT MEN- INGITIS—REMARKS.\*

BY E. H. LINNELL, M. D., NORWICH, CONN.

It is seldom that a physician has an opportunity of watching a suppurative inflammation of the tympanum for a series of years. The following case, therefore, is deemed worthy of record, furnishing as it does some suggestive thoughts in regard to the management of such affections.

I. A. was a very delicate child from his birth. It seemed hardly possible that he possessed sufficient vitality to withstand the various disorders of infancy and childhood. Though coming from healthy parentage and free from constitutional inherited disease, grave fears were entertained as to his reaching mature years. When about two years old he had scarlet fever, which left him with a suppurative inflammation of the left middle ear. In 1880, when he was eight years old, he first came under my care, but my record of the case dates from October, 1881.

At that time the membrana tympani was almost entirely destroyed, and a moderately profuse bland otorrhœa existed. The mucous membrane of the tympanum was pale and smooth,

\* Read at the meeting of the Homeopathic Medical Society of the State of New York, October, 1893.

but about two months later it began to present a granular condition.

Treatment was continued at frequent intervals and without marked improvement for sixteen months. During this time various antiseptic and astringent applications were used locally in connection with indicated remedies, and granulations and small polypi were frequently removed, but as often reformed. The discharge was kept moderate in amount, and at no time was any obstruction to its outflow permitted.

At this period (June, 1883) the patient was seen by Dr. Clarence J. Blake. He thoroughly removed all neoplastic growth and sent him back to me with the advice to continue my former line of treatment. The ossicles were then seen in position, and no positive evidence of caries was discoverable. Within two days granulations again sprang from the manubrium mallei and malleo-incudal articulation and from the side of the stapes.

In July, 1883, a carious tooth, in which he felt twinges of pain when ear was treated, was extracted, and others were filled. Subsequently treatment was more efficacious, and in August a cicatricial new membrane began to form around the periphery, the discharge lessened, and the granulations were easily controlled. By October the tympanum was entirely closed, except a small fissure extending for about one line downward and backward from the apex of the manubrium, and in this fissure minute granulation tissue still remained.

In September, 1884, I find the following record :

"History of case a repetition of former history. The condition has varied, but on the whole it has been better. Internal medication has been for the most part discontinued. Alcohol and a saturated solution of zinc acetate have exerted the most marked effect upon the granulations. Both have seemed to lose their effect after a few weeks. Treatment has for the most part alternated between the two. Have used no caustic since last year. At no time has the vicinity of the malleo-incudal articulation or the stapes been entirely free from granulation tissue, but the cavity of the tympanum has gradually assumed a more healthy appearance, and the cicatricial new membrane which has formed has been more stable. For several months past the posterior and upper portion of the tympanic cavity has remained closed and the discharge has been slight.

"Have used for some time a fifty per cent. solution of boro-glyceride, sometimes alone, sometimes with alcohol, half and half, and the effect has been more satisfactory than anything previously employed. The present condition is as follows: A central perforation bounded above by malleo-incudal articulation where there is still very slight pale granulation tissue. Edges of perforation are thickened and somewhat red. The posterior and lower part of tympanic cavity is closed with a cicatricial membrane, adherent here and there to inner tympanic wall. The manubrium mallei is drawn forward, leaving a slight fissure between it and the anterior wall. There is very slight discharge. On suction with Siegle's otoscope pus is drawn out from around the stapes."

In December, 1884, the record reads:

"Perforation now is only slightly larger than a pin's head. New membrane vibrates freely. Suction draws no pus through the perforation. The edges still look red and swollen, but no real granulation tissue."

Early in 1885 the patient had an attack of mumps and other acute illnesses which necessitated a discontinuance of active treatment. The new drum membrane sloughed, the discharge increased, and the tympanum again became filled with a reddish fleshy mass. Treatment was resumed and continued at gradually increasing intervals as improvement progressed. In December, 1885, the tympanic cavity appeared healthy and free from granulations, and soon after the discharge ceased and a cicatricial membrane entirely closed it. During the whole of 1886 he remained well, with a useful amount of hearing in the affected ear. No record of the exact amount was made. Early in 1887 the otorrhœa returned slightly and was accompanied with a swollen lymphatic gland under the angle of the jaw.

In August, 1887, he had, for the first time, an acute otitis media on the right side after sea bathing, attended with some pain and followed by a purulent discharge through the Eustachian tube. He was away from home at the time, and when seen, ten days after the onset of the attack, Shrapnell's membrane was red and bulging, and the remainder of the Mt. dull and retracted. Hearing was much impaired and there was still a good deal of expectoration of muco-pus. He recovered in two weeks under *merc.* About this time the discharge from the left ear, which

still continued, for the first time became offensive. The amount was moderate and the perforation was limited in size. There were no granulations observed again until March, 1888. One application of battery fluid (sulph. acid and bichrom. potash) destroyed them, and under the use of boroglyceride in alcohol the discharge again ceased, and only a small perforation remained, which was covered with a cotton pellet. This was removed from time to time, as occasion required, for two months. Thereafter he required no treatment and was free from annoyance for five months. Then a polypus appeared at the bottom of the meatus, springing from the anterior upper wall. This was removed. The drum membrane was entirely reformed, and he had no return of the trouble for three years and eleven months. His general health meanwhile had very much improved, and I regarded the case as cured.

In December, 1892, there was again a small perforation at the lower anterior portion of the Mt., with inflammation of the remaining portion, and slight secretion of thin bland pus. Another polypus appeared soon after, which was promptly removed. The discharge was brownish and moderately profuse, with frequent slight hemorrhages. Caries was again sought for, but not found. The tympanic cavity was thoroughly cleansed with a solution of peroxide of hydrogen injected through the perforation by an intra-tympanic syringe. Under this treatment, together with appropriate internal medication, there was rapid improvement. During the previous years he had had, when away from home, two other attacks of acute otitis media dextra, in addition to the one already alluded to. I did not attend him in either of these, and do not know whether there was ever a perforation of the right drum membrane. If so it completely healed, and he had no further trouble with the right ear until January 30, 1893, when he presented with severe pain, and examination showed bright redness of Schrapnel's membrane. Pain, fever, sleeplessness, and mental excitement soon developed and continued in spite of treatment, and by the third day there was evidence of suppuration within the tympanum. Paracentesis of the Mt. was made, followed by discharge through the incision and also into the throat, but with only temporary relief. Symptoms of meningitis became more pronounced, with a temperature varying characteristically from  $100\frac{1}{2}$  to  $103\frac{2}{5}$ , and a pulse from 54 to 65.

February 7th and 8th witnessed an improvement. Fever, pain, and delirium left, and sleep returned. Every effort was made to maintain free drainage from the ear, but the incision in the Mt. closed, and on February 8th a second paracentesis was made, followed by renewed discharge of pus. The patient became rapidly weak. Temperature became sub-normal, varying from 97 in the A. M. to 99 in the P. M., with dyspnœa, and previous pulse rate continued. There was considerable photophobia and slight impairment of vision, but ophthalmoscopic examination showed nothing save a very trifling fullness of the retinal veins.

A third paracentesis was made on the 14th of February, with temporary relief, but on the 18th pain and tenderness over both mastoids, but more particularly over the region of the right antrum, developed, with increased temperature, and nausea. The last paracentesis remained open, with sufficient drainage and moderate discharge. During his illness there had been constantly a slight discharge from his left ear. Ice bags were applied to the head, and *capsicum* administered, and the pain subsided, temperature fell, and patient had a good night's sleep, awaking on the morning of the 19th with a temperature of  $98\frac{8}{10}$  and all symptoms improved. A consultation with Dr. C. J. Blake of Boston was held on the evening of the 16th with a view to making antrectomy and opening mastoid.

After careful examination, and in view of the patient's debilitated condition and of the improvement during the previous twenty-four hours, but particularly because of the involvement of both antras, any operative measures were considered not advisable, and Dr. Blake expressed the opinion that they had not previously been demanded. On the 18th the patient had two chills in rapid succession, with nausea, vomiting, increased temperature, pain in occiput and whole length of the spine, and stiffness of cervical muscles. There was rambling delirium, but no convulsions or coma. Patient died February 19. Shortly before death the temperature reached  $106\frac{8}{10}$ , and the pulse, which had been continuously slow and feeble during his illness, reached 190. No autopsy was held, but a diagnosis of perforation of the tegmen tympani on the right side, and possibly on both sides, and general purulent meningitis seemed clear.

To recapitulate, we find an otorrhœa following scarlatina existing for six years with little or no treatment. A cessa-

tion of discharge, and a closure of the tympanic cavity with a cicatricial membrane, and restoration of useful hearing, after a little more than four years of treatment with various remedies and local applications, and removal of numerous polypi and granulations. A relapse after a year. Treatment resumed and continued with more or less regularity for a year and a half, when he again seemed well and continued so for three years and eleven months. Another relapse, continuing until his death, three months later. Three attacks of acute otitis media of the right ear between 1887 and January, 1893, when a fourth attack occurred during a relapse of the left ear. Rapid involvement of each antrum, first, and most severely, on the right side, and death in twenty days from purulent meningitis. It is impossible to say positively, in the absence of an autopsy, whether caries of both temporal bones existed, but it seems hardly questionable that the immediate cause of death was the involvement of the cranial cavity from the *right* ear, and it is somewhat surprising that an acute inflammation of this ear should have resulted fatally after a suppuration of the left ear had been controlled for nearly twenty years.

A review of this long clinical history suggests several practical lessons. *First* and foremost, it emphasizes the necessity of prompt, thorough, and persevering treatment of all cases of otorrhœa. The sequelæ of chronic suppurative otitis media are various, such as caries, necrosis, mastoiditis, phlebitis, thrombosis, meningitis, encephalitis, and abscesses of the brain. Such a condition may at any time endanger life, to say nothing of the annoyance, discomfort, and loss of hearing which it occasions. Thorough drainage must be maintained by the removal of all inspissated secretions, polypi, etc., and the enlarging of perforations when necessary.

*Secondly.* Thorough disinfection of discharges and the employment of astringent and healing applications are requisite. The dry treatment, especially with boracic acid, is often very efficacious, but great care must be exercised

lest the powder hardens, cakes, and causes obstruction. Of course the indicated homeopathic remedy is to be administered at the same time, but local treatment is also imperative, especially in chronic cases. I have made very little mention of remedies in this report, because a large number were used in the long course of treatment, and it is difficult to offer satisfactory evidence of their efficacy independently of the local measures employed, but they undoubtedly contributed largely to the results obtained.

The influence of carious teeth in aggravating and prolonging an otorrhœa is exemplified in this case, and also the remarkable power of reproduction of the membrana tympani. It also affords encouragement both to the physician and patient to persevere in spite of discouragement and frequent relapses, while it occasions much disappointment that a lethal issue of an acute condition could not have been arrested after serious consequences had been averted for so many years in the course of the chronic condition. It leads one to interrogate the methods employed to ascertain whether anything was left undone. Could not the original disease have been promptly cured if suitable treatment had been instituted early in the case? We are inclined to answer in the affirmative, but we must not lose sight of the great feebleness of the child in early years. In the light of the present advances in aural surgery would not the removal of the ossicles be wise in a similar condition? Such a proceeding was not advised by Dr. Blake, and the consent of the parents could hardly have been obtained if it had been deemed advisable.

## THE USE AND RELATIVE VALUE OF CYCLOPLEGICS.

BY HAYES C. FRENCH, M. D., SAN FRANCISCO.

In nothing is the unsettled condition of ophthalmic literature more apparent than in the variety of opinion that has been expressed by our highest authorities upon the question of the claims, utility, and relative value of mydriatics in the determination of refractive errors. On this subject our journals for years have teemed with conflicting opinions, and out of the chaos of bewildering controversy it is our hope to elicit a grain of ultimate truth. Our text-books in the main are non-committal, gracefully assuming a favorable attitude toward both aspects of the controverted question; but not so with the journals, which present a perennial line of bristling and positive opinion, about equally divided upon the merits and relative value of mydriatics as they relate to glass-fitting. The great and rapid improvement in devices for determining errors of refraction, independent of the testimony of the patient, has doubtless contributed largely to the growing skepticism of conservative minds as to the necessity of cycloplegics in many cases in which they were formerly believed to be indispensable; notably has the perfection of the Javal ophthalmometer and the triumphs of skiascopy added to this result. Even in the utilization of subjective evidence the prisoptometer and other apparatus for measuring refraction have added largely to the positiveness of results as compared with the slow and unsatisfactory methods with the ordinary trial case in hunting down the sly fox of accommodative spasm.

Although with these improved agencies the difficulties attending ciliary spasm have undoubtedly been reduced to the minimum, the vitality of the claims of mydriatics, and notably those of atropine, is still manifest, and the consensus of authoritative opinion seems to award to atropine an abiding and indispensable service in the successful solution of many refractive problems. In this compilation we lay claim to no originality, but simply hope to elicit some grains of ultimate and condensed truth from a wide field of discussion.

In April, 1889, Dr. R. O. Cotter, in a paper read before the Georgia State Medical Society at Macon, entitled "Correcting the Whole Error of Refraction, and the Necessity of a Mydriatic," etc., says: "I can certainly say that the most glaring errors which I have encountered have been in patients who have previously been in the hands of oculists who pretended to fit them with glasses without using a mydriatic. . . I have adopted its employment [atropine] as my rule, invariable and positive. . . When I use the term mydriatic I do not mean a one- or two-grain solution of atropia, which simply dilates the pupil, and only partially paralyzes the accommodation; I use a four-grain to the ounce solution, and drop it into the eye sufficiently often to make the muscles thoroughly passive."

This writer says he is not prepared to give an opinion upon homatropine, but speaking of two of his colleagues who had used it says that while "one claimed that it only partially paralyzed the accommodation, and that he had abandoned its use, the other said, it fully paralyzed the accommodation, and that he used nothing else in refraction work. We are looking for the genius who can prove both these contentions to be true."

Our lamented colleague Dr. George S. Norton, whose authority we are glad to honor, in the second volume of this JOURNAL has given a tabulated report of 1022 eyes examined under atropine. In his summary he says: "Atropine has, as a rule, been employed, as its action has seemed to be more thorough and complete upon the ciliary muscle

than most other mydriatics, though others may answer the same purpose." In the October issue of the same volume, Dr. N. L. MacBride says of hydrobromide of hyosciamine, giving a case: "I relate this case in full, because it seems to show in a marked manner the superiority of hyosciamine over atropine in rapidly paralyzing the accommodation." He further says: "A solution of hydrobromide of hyosciamine of one per cent. acts as a powerful agent in paralyzing the ciliary muscle, even when in a state of spasm; a single instillation is enough; paralysis is complete in from eighteen to thirty minutes. . . One instillation is as good as repeated instillations of atropine." In Vol. iv. of this JOURNAL Dr. John L. Moffat confirms Dr. MacBride's claims in unstinted eulogy, and incidentally points out why the terminal "ide" should be "at (e)," each one standing by the ultimate of his own patronymic.

Dr. Casey Wood in *Amer. Jour. of Ophthalmology*, June, 1891, in a paper entitled "Solid Mixtures of Homatropine and Cocaine as a Substitute for Atropine and Duboisine in Determining Refractive Errors." After a thorough comparison of the experiments of Lang and Barrett, Schell, Jackson, Holt, Oliver, Nettleship, and others this able writer sums up his own convictions thus: "I have devoted some months of the past year to experimenting with mixtures of homatropine (alkaloid, Merck) with cocaine (alkaloid, Merck), and I hope to be able to show, in confirmation of Lang and Barrett's statements, that when used in a certain definite manner and dose and with proper excipients this combination is a thoroughly reliable cyclopegic, and *quite as satisfactory as atropine* [italics ours] for determining the refractive state of the ametropic eye. Furthermore, the employment of this mixture is not followed by the annoying symptoms incident to the employment of atropine, duboisine, or hyosciamine. It accomplishes its purpose within an hour after being introduced into the conjunctival sac, and the ciliary paralysis passes off, or may be made to pass off (by the use of eserine), within twelve, or at most twenty-four, hours." In the same journal of

September, 1893, under the title of "Further Studies," etc., along the same line, Dr. Wood in the main confirms his earlier observations, and further emphasizes the dangerous and unreliable character of duboisine and hyosciamine. Dr. J. J. Chisholm, the veteran oculist of Baltimore, has long been an uncompromising advocate of the infallible perfection of homatropine as a cyclopegic; on the other hand, Dr. Cotter affirms that after the use of homatropine thoroughly in the strength from five to twenty grains to the ounce the subsequent use of a four-grain solution of atropine showed that only half the error had been revealed by the homatropine. He further says: "I have given homatropine a sufficient [?] trial, and sincerely regret having to give it up." Many cases have been reported in which the thorough use of atropine has failed to control ciliary spasm, though the other physiological peculiarities of the drug have been induced.—Dr. W. H. Bates in *N. Y. Med. Jour.*

#### DANGERS ATTENDING THE ADMINISTRATION OF MYDRIATICS.

In all probability a majority of the cases in which dangerous, or at least very unpleasant, if not alarming, symptoms have followed the administration of these drugs have never been made public. Yet our literature is not without numerous recorded instances of this kind. In a *Report of the Proceedings of the Amer. Ophthalmological Society*, held at Washington, D. C., September 24, 1891, Dr. Sutphen says: "I wish to refer to a case which I have under observation at the present time. It was necessary to enucleate one eye on account of sympathetic iritis in its fellow. To dilate the pupil in the eye with iritis I used sulphate of atropia in a solution of four grains to the ounce every hour or two. Within twenty-four hours the patient became wildly delirious and so violent that she had to be strapped to her bed. The delirium gradually subsided after a cessation of the use of the mydriatic. A second trial of the atropia a few days later was followed

by a flushed face and signs of a nervous condition, which immediately disappeared after a small dose of morphine." At the same session Dr. B. A. Alexander reported a case of delirium from the instillation of a single drop of hydrobromate of hyosciamine, one per cent. solution, which lasted twenty-four hours, and during the same discussion Dr. Myles Standish of Boston reported three cases in his own practice of delirium following the instillation of a one per cent. solution of hyoscine.

Dr. G. E. de Schweinitz in the *Therapeutic Gazette* reports two cases of intensely painful neuralgia which was induced by the instillation of sulphate of hyosciamine in the strength of one-fourth of a grain to the dram. He describes the patient as presenting pinched features, contracted brow, clenched hands, and every evidence of intense suffering. The patient said, "I feel as if someone had a gimlet and was boring a hole in my optic nerve." Tension was normal and no change in the eye-ground. After the instillation of eserine, although the action of the mydriatic was not neutralized, the pain gradually subsided. The subsequent use of homatropine in cumulative doses for the correction of the refractive error produced no inconvenience, and the pain did not return. Dr. S. D. Risley, being consulted in reference to this case, said he had had a similar one resulting from the use of the same drug in the same strength, and according to his own testimony he became an adherent to the law of similars long enough to cure his patient. Let the witness speak: "When Dr. Risley visited the case he reasoned that it was possible that the drug had failed not only to paralyze the ciliary muscle completely, but this structure had been provoked into a state of tonic spasm; hence if complete paralysis were quickly secured the symptoms would be relieved. Acting on this idea, he repeatedly instilled into the eye of the patient drops from the same solution which had provoked the pain, and was gratified to find his [?] theory had led him to the correct treatment. Relief followed very quickly, and there was no return of the trouble."

## FORM OF THE DRUG.

The United States Dispensatory is authority for the statement that "recent chemical and pharmacological experiments have shown that hyosciamine, duboisine, and daturine as found in the shops are not only isomeric, but are one and the same alkaloid under different names." There is very little doubt but that not only the failure of alleged mydriatics in their cycloplegic effect, but many instances of poisoning, and much of the conflicting testimony in regard to their value, is due to an unreliable preparation; and while the ophthalmic disks are charming for their neatness and ease of application, they are open to the grave objection of being unstable and liable to contamination. Fresh preparations of the drug from perfectly reliable houses will alone insure anything like uniform and satisfactory results in the use of mydriatics. In the application of mydriatics it is desirable to get as little as possible of the drug into the lachrymal passage, and to avoid this have the patient keep the eye well open during the instillation, and if possible avoid winking till the drop is diffused over the cornea and absorbed, thus avoiding its passage with the tears into the throat, and its failure to impress the only region desired to be affected.

## EMPHYEMA OF THE NASAL ACCESSORY SINUSES.

BY FRANCIS B. KELLOGG, M. D., TACOMA, WASH.

The accessory sinuses of the nose are four in number, viz., the maxillary, frontal, sphenoidal, and ethmoidal. They are lined with mucous membrane, and communicate by their orifices with the cavity of the nose.

Their common office is to give lightness to the bones of the face, while they doubtless also play a minor part in the respiratory and acoustic functions of the nasal cavities.

In common with the latter they are subject to acute and chronic inflammatory processes, but owing to their inaccessibility it is only when these processes result in the formation or development of morbid products that their previous existence is made probable, and in these cases it is assumed to account for a condition which would otherwise be difficult to explain. The most frequent product pointing to such an origin is pus. This is probably the result of the retention and degeneration of inflammatory products in the cavity.

In those cavities whose outlets are favorably situated for drainage this means an obstruction of the duct. The frontal sinus and ethmoidal cells are such cavities, and for this reason are least liable to empyema. The outlet of the sphenoidal sinus is somewhat less favorably situated, but when unobstructed the ordinary motions of the head are sufficient to tip any accumulated secretion into the back of the nose, whence it passes into the naso-pharynx and throat.

The antrum is the only one of the cavities under discussion having its outlet at the top. Hence it is the most liable of all to become the seat of empyema or retention abscess.

The antrum occupies the cavity of the cheek bone, and is of varying size in different individuals. It is irregular in shape, and bounded above by the floor of the orbit, below by the roof of the alveolar process, outwardly by the external portion of the superior maxillary, and internally by the wall of the nasal cavity, made up of portions of the superior maxillary, the ethmoid and palate bones. It communicates with the cavity of the nose by a passage near the upper border of its inner surface, where the three last mentioned bones meet, and behind the middle turbinated bone.

With the outlet in this location drainage is impossible with the head in the upright position unless the cavity is full and overflows at the top. This affords us an important means of differential diagnosis. When the patient lies upon the opposite side the orifice is brought into a dependent position favoring drainage; hence such a patient is apt to report that there is a discharge from *one nostril* when lying upon the opposite side. The same conditions are brought about by hanging the head between the knees, *i. e.*, inverting it. This is the most satisfactory method of confirming the diagnosis.

Before making an examination establish four points: 1st. Is the discharge of which the patient complains, pus? 2d. Does it come from one side of the nose only? 3d. Is it offensive to the patient as well as to others? 4th. (Important, but not essential to the diagnosis), Has the patient a decayed bicuspid or molar tooth?

Having established these three or four points, have him blow his nose perfectly clean, and then hang the head between the knees for a minute or so. If there is pus in the antrum he will, after resuming the upright position, be able to blow a considerable quantity from the corresponding nostril.

The odor of this pus is peculiar, and once experienced it is not to be mistaken, although it has nothing like the sickening feter of ozena, or the horrible stench of necrosis. Given, then, the foregoing phenomena, the diagnosis is tolerably certain. To adopt any operative measures for relief, however, without corroborating it by means of direct inspection with the head mirror and proper illumination would be inexcusable and reprehensible to a high degree. The antrum opens into the nose far up behind the middle turbinated bone. The orifice is therefore hidden from view, and pus escaping from it would apparently spring from behind the middle turbinated bone. After the patient has inverted the head it will be seen in this locality, and if wiped away with a dossil of cotton will at once be replaced by a fresh supply.

This is an important point in differentiating between empyema of the antrum and that of the other cavities, which I will emphasize at this point.

While pus from the antrum springs from between the middle turbinate and the wall of the nose, when it flows from the sphenoidal sinus or ethmoid cells it is first seen on the septal aspect of the middle turbinated. Pus from the frontal sinus appears at the same spot as that from the antrum, but does *not* follow an inversion of the head.

To sum up, if the patient reports an occasional flow of malodorous pus from one side of the nose, especially liable to occur upon lying down, or while engaged in some employment which involves bending the head, suspect empyema of the antrum. Look for a decayed tooth as a probable cause, and corroborate the diagnosis by inversion of the head and direct inspection.

In addition to the above indications the authorities mention pains in the cheek bone and sensitiveness upon percussion, also dullness of the percussion note as compared to that of the other side. Trans-illumination of the antrum by means of an electric light held in the mouth has been advocated. I mention these symptoms and

measures only to say that in my hands they have proven not only negative, but positively misleading.

Empyema of the other sinuses may be disposed of in a few words. They are comparatively rare, though some of this variety are undoubtedly due to their obscurity and consequent difficulty of detection. In affection of the frontal sinus there is pain over the corresponding frontal region, tenderness upon percussion, and possibly a bulging of the bony plate, in which case you would also have redness and swelling of the integument. The latter you would only get where there was total obstruction of the infundibulum or duct into the nose, and therefore there would be no nasal discharge in such cases. Less pronounced cases, however, would show a purulent flow into the middle meatus, favored by the upright position.

Affection of the ethmoid cells is rarely discovered until it has broken down the thin partitions dividing the cells from each other, and then pushed the os planum of the ethmoid into the orbit, causing fixation and bulging of the eye.

The sphenoidal sinus is also sometimes affected, though rarely. Here also the orbit is liable to encroachment, and the eyeball to displacement, though to a less degree than in the previous affection. In both ethmoidal and sphenoidal affections the patient is liable to terrific headaches, much local discomfort, and where the ducts are unobstructed there is a discharge into the nose.

CASE I. Mr. P., lawyer, age about thirty-five years, with an excellent history of almost perfect health, came to me in April, 1891, saying that he was annoyed by a frequent discharge of malodorous matter from one side of the nose. This would happen when he was working about the garden or lawn, and the fetid odor of the discharge was most offensive both to himself and others. He was never conscious of the odor except after noticing the discharge. The matter was bright yellow.

This was my first case of the kind, but I at once suspected the antrum. The nasal cavity upon inspection was perfectly clean and healthy. After inverting the head, however, the aspect was

entirely changed. The inferior meatus was full of pus, as was also the space between the middle turbinated and the wall of the nose. Upon wiping this away more at once appeared, running from behind the middle turbinate. It had the peculiar fetor of degenerated pus. His teeth were perfectly sound, nor was there any history of a previous dental affection. This left me wanting this most frequent clew to the cause of the trouble, and also barred me from this avenue of approach to its seat. The patient objected to losing a perfectly sound tooth unless it were absolutely necessary, and I felt constrained to enter the antrum by some other avenue of approach in order that the diagnosis might be made absolutely certain before obliging him to do so.

The text-books described and commended the operation of Mikulicz as an easy and efficient one. This consists in perforating the wall of the antrum through the inferior meatus, thus avoiding the necessity of sacrificing a sound tooth. I mention this operation only to say that in my hands it was very unsatisfactory. I found it very difficult to get the perforator behind the inferior turbinated so as to work effectively with it. Aside from this objection, the bone is generally thickest at this point.

After trying here and failing I punctured the wall in the middle meatus. Through the perforation I injected hydrogen peroxide, and was at once rewarded by an overflow of thick creamy froth which filled the patient's nose and mouth.

For a month I washed out the antrum daily in this manner. There was no further spontaneous overflow and all odor ceased. But it was impossible to wholly stop the suppuration, so that finally I was forced to draw the second bicuspid tooth and drill through into the antrum, thus securing drainage at the lowest point. Through this channel I inserted a silver tube, thus enabling the patient to daily cleanse the cavity. At this point I left for Europe. On my return nearly a year later I found that there had been practically no suppuration for some time, but the patient objected to allowing the opening to close, preferring to keep it where he could be sure of having it under his control.

CASE II. Mattie H., a servant, age thirty-one years, came to me while Case I. was still under treatment. She complained

simply of catarrh, and on examination I discovered what I supposed was the cause in a polyp dependent from the middle turbinated bone. This I removed, but the discharge, she said, still continued. I could discover nothing in the nose beyond an abundant supply of mucus. Chancing to ask her if the discharge ever had a disagreeable odor, she said that it did. Her upper teeth were all bad, and following up this line of investigation, I directed her to invert the head. In a few seconds I had the evidence of antral empyema before my eyes and nose.

I at once perforated the antrum through the socket of an old stump of a tooth and confirmed my diagnosis.

Both of these cases I referred to one of my colleagues on leaving for Europe. The first patient insisted upon treating himself until my return. The other underwent treatment for some time, and then stopped, as she derived no benefit. On my return she presented herself again for treatment.

It proved a most intractable case. I tried nearly everything. At last I used solutions of nitrate of silver in increasing strengths until I injected one containing eighty grs. to the ounce. These solutions I neutralized, after leaving them to act for a few seconds, with a salt solution, washing them out through the nose. The suppuration became less and less, and was finally quite insignificant, when unfortunately the patient removed to another part of the country.

CASE III. My third case was an interesting one, both because of the result and because of the prominence of the patient.

Mr. Edw. Kimball (I use the name by permission), who has been the means of raising over \$15,000,000 of church debts in the United States, was referred to me in May. Although sixty-nine years of age, he had for years enjoyed phenomenally good health in every particular except the one for which he consulted me. This he described as a catarrhal trouble which had annoyed him for twenty years. Especially upon lying down would he experience a discharge from one side of the nose.

He had consulted at different times eminent practitioners of New York, Philadelphia, and Chicago, who had reassured him, giving him some medicine, and advised simple cleansing of the nose.

Was the discharge pus? Yes, he thought so. Was it offensive? Decidedly. Teeth replaced some years since by an artificial set.

On inspection a small polyp was disclosed upon the middle turbinated bone. After inverting the head and resuming the upright position there was an abundant flow of pus from the locality of the antrum, having the characteristic odor. I operated upon the following morning, opening the antrum as before described. A generous flow of pus followed. My patient was much gratified to find after all these years the cause of his trouble.

I had told him of the intractable nature of the disease, and prepared him for a long siege of treatment at best. I fitted a tube to rest against his plate and equipped him with an appliance for keeping the antrum clean. Under his daily irrigation with a simple saline solution, the discharge ceased entirely during the first week, and when I saw him a few days since, after a month's absence, he reported no return, even when left for two, then three, then four, and so on, to ten days without cleansing. My examination justified his abandoning the irrigation and gave a similar result, and I advised allowing the opening to heal, which he is now doing.

I consider this the more noteworthy on account of his age, the long continuance of the disease, and its obstinate nature.

## A CASE OF OTITIS INTERNA TRAUMATICA.

BY CHARLES H. HELFRICH, M. D., NEW YORK.

Our knowledge of the pathology of the diseases of the internal ear is still so meager that all cases having any bearing upon the subject are worthy of attention.

It is lamentable that such a discrepancy exists between our knowledge of external and middle ear diseases on the one hand, and internal ear diseases on the other.

Every effort should be made to place the pathology of the latter structures on a plane with the former. Their inaccessible position making direct inspection impossible, our studies for the most part are confined to the history of cases, and hence the importance of reporting them. Opportunities for holding *post-mortem* examinations are rare, and frequently only come when some other disease produces death. Very interesting appearances found on such occasions have been rendered valueless by the absence of any history of the ear trouble.

Accurate notes should be kept when disease of the internal ear is suspected, and if not reported, preserved for a future possibility of being able to obtain a *post-mortem* examination.

The following case presents some unusual features, and is worthy of being reported :

Lizzie S., aged five, sent by Dr. W. H. Krause May 22, 1893. Eight weeks ago she fell while "skipping rope," striking upon the occiput. She ran home, complaining of pain at the back of her head. No laceration of the scalp occurred and the parents were not alarmed. Later she felt drowsy and slept for several hours.

On awakening she again complained of the pain at the back of the head.

No discharge of blood or serum from the ears had taken place ; her speech was unaffected, and her mind was perfectly clear.

The following morning she was attacked by a fever which kept her confined to her bed for eight days. During the first two days of this period she was unconscious, but not delirious.

Her temperature ranged from 100 to 104. At no time was there vomiting.

A slight difficulty of speech was manifest on her first return to consciousness, which progressively grew worse until it was impossible to understand her.

Her enunciation previous to the injury was very good for her age.

No other symptoms of paralysis occurred in any portion of the body.

The mother did not notice the child was deaf until the eighth day, when she was allowed to get out of bed. As the deafness was already profound, it probably had been present earlier. On getting out of bed she was taken with such severe vertigo that she could not stand without assistance. Her mother thought the sight was affected during the first two days of the fever, but as the child was unconscious at this time, and had no trouble with the eyes subsequently, it is very doubtful.

There was no previous history of any ear trouble. She had had measles, pneumonia, and whooping cough within the first eighteen months of her life.

On the occasion of my first examination I found the deafness absolute ; speaking in my loudest tones through a stethoscope applied to her ears produced no impression. The tuning fork applied over the mastoid process did not appear to produce any effect either. The membrane appeared healthy with the exception of a slight redness of Shrapnell's membrane on the right side. Both Eustachian tubes were readily inflated, but produced no improvement of the hearing. An ophthalmoscopic examination revealed nothing abnormal. The aphasia was very marked ; the child endeavored to speak but could not make herself intelligible.

The vertigo caused her to sway from right to left, and occasionally was severe enough to make her lose her balance completely. Her general health seemed unaffected. She remained

under treatment about a month without any change and then disappeared.

A week ago at my request her mother brought her to me for another examination. No material improvement could be noticed in her hearing, although her mother thought at times she could make out certain words, as her answers were correct. She confessed, however, it was only at such times that the child was looking at her and upon subjects which might be inferred. The aphasia was less marked, that is, her own people were able to understand her, while strangers could understand words now and then. The vertigo had almost entirely disappeared. Both membranes appeared normal.

Absolute deafness is positive proof of labyrinthine affections, as no disease of the external or middle ears will render a patient deaf to all sounds. In the latter diseases bone conduction is always present and in consequence the presence of some hearing power can be demonstrated.

As absolute deafness is very rare, this pathognomonic symptom is seldom observed. Its presence in this case makes the diagnosis absolutely certain. Additional proof is furnished by the absence of any important manifestations referable to the external or middle ears. Vertigo causing the patient to sway in a lateral direction is considered by Gowers to be characteristic of labyrinthine disease. It was well marked in this case, the child frequently falling either to the right or left.

The diagnosis being satisfactorily established, is the disease primary in its origin or secondary to some brain trouble or a fracture of the skull?

A fracture of the skull sufficient in extent to cause total loss of hearing of both ears ought to produce more serious symptoms and more paralysis than an ataxic aphasia. The history of the case does not seem to warrant the assumption that a fracture took place.

There is no doubt but that as a result of the concussion the fever following the injury was due to meningitis. Such a belief satisfactorily explains the presence of aphasia, which is rather an unusual complication.

I do not believe the deafness is due to, but coincident with, the meningitis. Both the auditory and facial nerves pass through the meatus auditorius internus and an extension of inflammation could hardly affect the one without involving the other.

The trouble, in my opinion, is primary and due to hemorrhage in the labyrinth.

## A STUDY IN LIGHT AND REFRACTION—II.

BY W. U. REYNOLDS, M. D., NEW YORK.

In the further study of refraction we must investigate more fully the principles connected with the formation of the focus at the distances behind the lens as we have measured them with the aid of two points. The moving lines cross the immovable ones, which lie at a certain angle, the apex of which is at the focus of the anterior parallels.

These parallels are merely the outlines of a longitudinal section of a cylinder which is filled with other lines of direction, connecting not only the outlying points of the end of the ray with all the other parts of the lenticular surface, but each particular part of the lens' surface with every and all parts of the area of the end of the ray.

We can have our radiant either in the object or in the screen. If in the screen, and it is within double focal distance, a small area of light will be made a larger one at the place of the object. If in the object, a small area will be made a still smaller one at the screen's position. The particular points we have selected, as well as all points within them and outside of them that can be connected with corresponding points on the lens by lines parallel with the principal axis, most certainly can never change their relationship by any movement of the object in the direction of the principal axis, no matter how great the separation may be made, and consequently their angle of incidence can never change; consequently, again, their angle of refraction can never change, and the refracted parallels must remain diagonal behind the lens at an

unvarying angle though the object be removed to the utmost infinity. When it has reached this point there will still be a difference between the internal diagonals and the enveloping and intermingling parallels. An eye, then, which sees distinctly objects at 240 inches must either be myopic and have that distance its infinity or be using an amount of accommodation corresponding to that distance.

On trial of the lenses in the test case a plus 1 U. corrects all stronger than a forty inch for an illuminated object at twenty feet. Those of long focus are not brought up to the proper point.

When, however, the object is closer than this distance we find we have to use this unit in addition to a focal length equal to the distance of the object.

For the higher powers, then, a power of one unit corrects from infinity to parallel rays.

Allowing this there must be a difference of two units between a myopia of twenty feet and a hyperopia of the same degree of ametropia, and to change a hyperopia to a myopia of the same degree would require an amount of power equal to double the ametropia. This has been demonstrated with the test type (see article on "Unit of Measure of Refraction"). There being the same amount of plus ametropia on one side the zero condition, there is minus ametropia on the other.

The object ends of the diagonals must always be separated from the parallels entering the lens at the same point by the width of the ray. The proportion of this width to the distance becomes smaller and smaller as the distance is increased, but never reaches zero.

This is something like the relations of a hyperbolic curve to its asymptotes, which are two diagonal lines continually approaching the curve, yet never actually reaching it, the distance of separation continually shortening. In the arrangement of infinities, however, the separation never changes, but only the proportion between it and the distance.

We must here recall the fact that a mathematical point

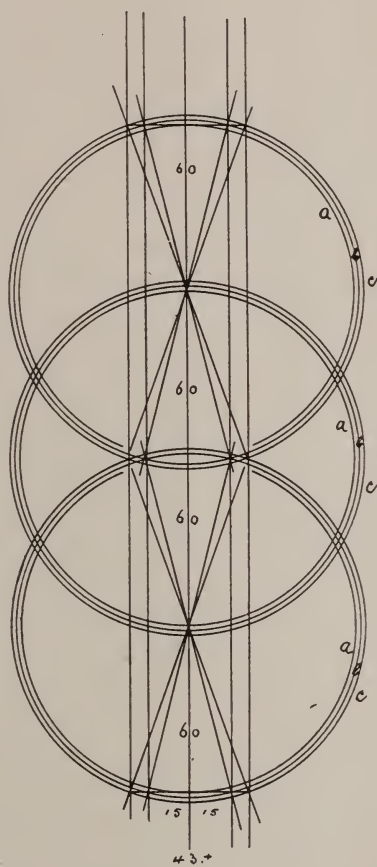


Fig. 1.

has neither length, breadth, nor thickness, being merely position, and cannot, strictly speaking, be visible. How large a diameter an optical point has might be a matter for discussion, but it would seem necessary for it to be at least equal to the diameter of the lens surface if it is to give the full influence of all the parts of the lens, these different parts having different degrees of refractive power.

A diagram of a lens that will bring the points of the object to the proper focus behind when the lines of direction are projected through on the index of refraction for glass (1.5 or 3 to 2) is made for any length of focus as follows (see Fig. 1): Measure off, on a central axis, four focal lengths; through the center mark and through each of the extreme marks draw a perpendicular to the principal axis; on these measure a quarter of the focal distance on each side the principal axis; connect these by lines running as the principal axis does, and we have the parallels; run diagonals through the center marks in front and behind the lens, the anterior and posterior foci, and we have the diagonals on which the edges of the picture run. With the crossing point of two diagonals behind as a center, draw a circle through the points on central cross line where the parallels and diagonals cross it. Do the same for the other side of lens. Now run tangents to these circles on each arc formed by the overlapping at the points of intersection of the principal axis; extend these tangents until they intersect the diagonals from the other side of the lens. Now with the original centers make two new circles through these points of intersection of tangents and diagonals. The overlapping of these circles is the lens.

The length of the radii of these circles and the diameter of the lens (half at a time) can be calculated to a nicety by the familiar base, upright, and hypotenuse method. Naturally the difference in length between the base or cosine and the radius is the "versed sine," which is half the thickness of the lens. The whole thickness of the lens is almost exactly one-eighth of the focal distance or cosine, while

the diameter of the lens is to the radius as 1 is to 1.4796, and would be as 1 is to 1.5 or as 2 is to 3 if the diameter of lens was about one per cent. shorter.

With the center of lens as a center, draw a circle with a radius equal to the cosine, or what we called the focal distance (circle *a*), another with a radius equal to focal distance plus one-quarter the thickness of lens (circle *b*), and another of the same radius as the lens surface. Have the same circles about each of the foci.

At the outer sides or ends of the end circles draw tangents to circle *a* at the points of intersection of principal axis, producing them to be chords of the outermost circle (*c*). They will intersect circle *b* at the intersection of the parallels. We can now run diagonals from the periphery of the lens through the foci and they will intersect the circles *c* where the tangents do. The chords of circle *b* are the object and image, and the part between *b* and *c* is light, the ray not in this case equaling the lens in diameter.

The object is on a flat surface, and the image with the edges in perfect focus is on a flat surface and of same size as the object.

The screen and object surface are at twice the focal distance from the lens. The extreme ends of the chord of circle *c* are on a radius equal to that of the curve of the lens surface.

A lens made on this principle would be very thick if the focus is long. All our lenses are made of the same diameter and thinner. They are consequently all under stereopac influence except where the focal length is not greater than twice the diameter. The lines upon which the picture advances, however, are united at a corresponding distance from the optical center, and the increase and decrease in the size of the image is proportionally the same, as experiment shows.

As the picture advances upon these lines it becomes smaller and smaller, and there must be a distance for the object at which it would be invisible.

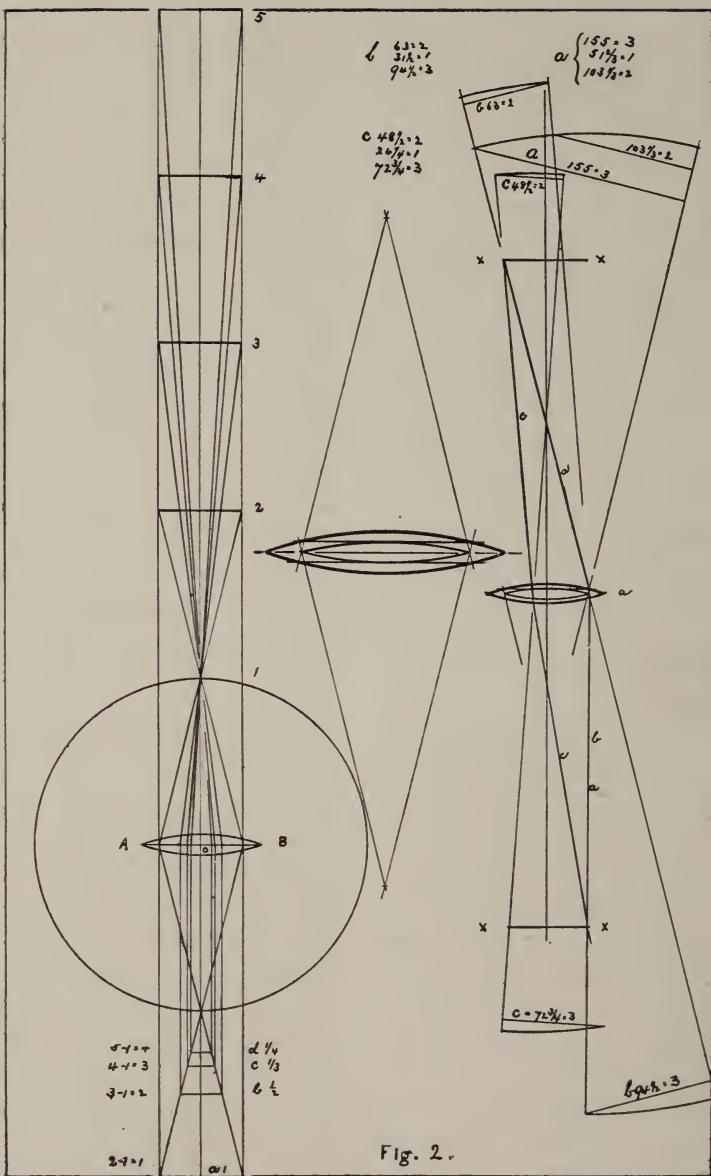


Fig. 2.

In connection with the advancement of the picture upon the principal axis it should be said that on using in a darkened room a small gas jet and gradually removing from it with a lens and screen, the screen had to be approached toward the lens until at about a distance of twenty-five feet from the light, when on increasing the distance still more the screen had to be moved further away from the lens to get clear outlines, that is, the focus elongated. A long focus lens was needed for success.

Having formed our lens, we can now project lines through it at the rate of the index for glass, as shown in Fig. 2, in which two lines from the same point in the object are projected through. The line  $c$  entering on the radius of the anterior surface, is perpendicular to it and receives no deflection until emergence. Such lines will cross each its fellow of the other side of the principal axis at a little more than half the focal distance behind the lens, and consequently do not reverse the picture until then. These must be some of the lines of the erect emerging picture spoken of in the experiments of the previous study, and probably are the lines of the picture on anterior surface of the lens.

In Fig. 2 is a lens on a larger scale, to show the construction for this index more plainly.

There are certain points on the anterior surface, which when connected with points of the object by diagonals, will so control the direction of the deflection that it will coincide with the radii of curve of the posterior surface. These diagonals form a focus about the center of curve of posterior surface in front of lens, and a screen at this point, twisting the lens a little, will have a picture of the object upon it. A mirror held behind a lens, with an illuminated object in the field, in a darkened room shows distinctly an image of the object in the *dark area* of the image of the lens itself. At the anterior focus of the lens place a disk having an opening in its center. A movement of this disk toward or away from the lens cuts off the margins of the image more or less, according to the extent of the move-

ment, but the brightness of the portion of the image remaining is not in any way affected. An image of the circular opening encroaches upon the object image's outlines. That is, the field is constricted. These phenomena occur with the mirror at random distance, and also when the room is brightly lighted.

It is evident the conditions are different where we have a darkened room and a ground glass screen; then we can get an image on the screen the full size of the object with the same circular opening placed close up to the lens, either behind or in front of it, the image only being dimmer.

Is the first or the second pupillary action? The first cuts off the image, which the second does not. Also is the disk of light formed when we measure an eye with the parallaxmeter an image of the pupil according to the first experiment, or is it limited by a phenomenon of polarization, such as we might expect to occur in the second experiment?

The conviction is forced that it is a shadow of the images on the surfaces of the lens which forms an image on a screen, this only becoming visible when certain light becomes destroyed. This light we have seen is in two cones with their apices at the focal point. In the mirror, if it is placed within the focus, this convergent light is reflected back toward the center of lens and is not seen, and when the mirror is further back it is too divergent to enter the eye and blur the image there. In a telescope or when the eye is at twice the distance, more or less, from the lens focus this picture can be seen, the blurring light being too divergent.

The inclination of these diagonals appears to be the same proportionally to the focal distance for parallel rays, and half, or perhaps we may say quarter that for all lenses, since any other inclination does not agree with experiment.

If we say all picture-forming rays enter after first passing through a point distant in front of the lens equal to the focus of parallel rays, measured from the optical center (this is not the center of curve of posterior or anterior sur-

face), and go to a line through the optical center at right angles to the principal axis, where they become parallel to it, going thence straight in, we will have the focus for each point of the object where these lines meet the diagonals we are describing, and the same length of focus and proportional size of image will result.

In Fig. 2, on the left is constructed a diagram representing this. That they do not go straight in, however, but on these diagonals, would seem to be proven by the enlargement of the image on the screen when it is moved back from the lens, the relations of lens and object remaining unchanged. In the mirror this enlargement does not occur, because here is seen what is actually on the surface.

One effect of a lens, therefore, is to destroy certain light that other light may make an image of an object on its transparent surface visible on an opaque surface behind it.

The other rules for finding the length of focus and diameter of image give the same result as the method of multiples of the focal distance. One small example will illustrate.

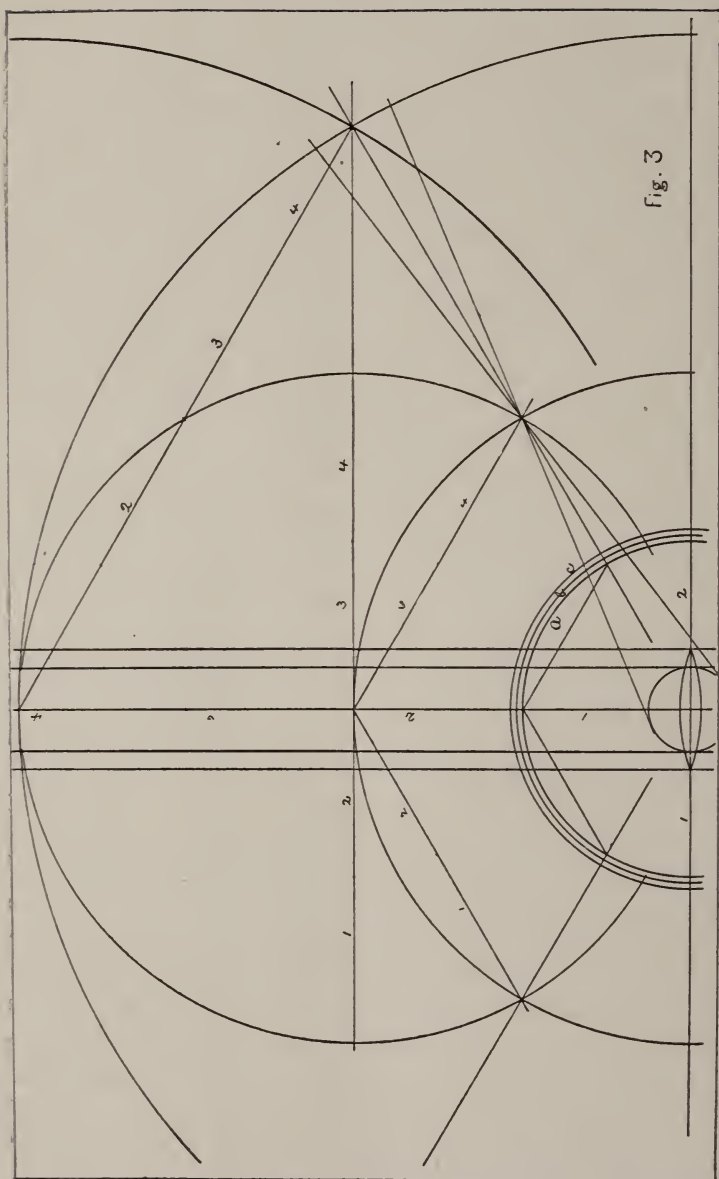
Object is 15 inches in diameter and 264 inches from the optical center of a 24-inch lens. Being eleven times distant, the focus is  $\frac{1}{11}$  of  $24+24=26.4$ , and the diameter of image is  $\frac{1}{11}$  of 15 inches = 1.5 inches.

With the other rule we multiply 24 by 264 and divide the answer by 24 minus 264, or  $\frac{24 \times 264}{24 - 264}$ . The reduction of this gives the same length of focus. To get the diameter or chord of image we will have to use the axis, thus, by proportion,  $264 : 26.4 :: 15 : \text{the size of image}$ . This is 1.5.

It will be seen also that the process can be still further simplified, since the focus is the same proportionate part of the whole distance that the image is of the object, and it is only necessary to divide the distance by the length of focus for parallel rays, and deduct 1 from the quotient to obtain the proportionate number.

Fig. 3 is an attempt to show the circles of light about a point on the central axis, showing how for that axis the light disappears at the polarizing angle where the periph-

Fig. 3



ery cuts a circle through the object. This combination is to move above in all directions so as to exist in all parts of the field, only limited by the extent of cornea exposed. It is one of these halves or sides that is projected through each opening in Scheiner's card when a distant cloud is viewed, at least if the edges of the retinal disks are made to just touch. Between the two openings is an opaque distance around which the light from some point on the central axis must bend in order to reach the retina, and meeting that from the same point refracted through the opposite opening, makes the opaque separating bar invisible. The outer edge is supposed to be limited by the polarizing angle. It perhaps represents all the light of which the central axis is the normal.

Taking the principles involved in the parallels, diagonals, and half-focal distance arrangement and those of Fig. 3 as a guide, we will say we measure a quarter of the focal length of the eye, and the ray corresponding to this should be eight times this in diameter with the object in the center. This makes the outer parallels tangent to a sphere having the whole focal distance as radius, two radii or eight quarters making a diameter.

One practical benefit to be derived from the division into rays is a knowledge that astigmatism can be caused by a malformation of the retina, and especially of the macula and fovea centralis. The very slightest change from regularity in the curve of the fovea should distort the vision of small objects.

Taking the distance from optical center to retina to be .62 inch and the distance of objects 240 inches, we would divide their diameter by 400 to obtain the diameter of retinal image. An astigmatic card of 10 inches in diameter would appear on the retina as .025 inch in diameter. The diameter of the macula lutea is given as  $\frac{1}{12}$  or .0833 inch, more than three times the width of the picture of the card.

Astigmatism may, as well as simple ametropia, be only temporary and changeable, as the frequent return of most carefully selected glasses shows.

## SYPHILIS OF THE NOSE.

BY C. GURNEE FELLOWS, A. M., M. D., CHICAGO.

The nasal manifestation of syphilis is not described as a distinct affection in many of the text-books upon the diseases of the nose and throat, and comparatively little is found in current literature upon this subject.

Recent experience has, however, shown some points which I fail to find explained, but which seem worth discussion.

All writers agree that primary syphilis of the nose is rare, but cases are reported from time to time. Secondary manifestations are much more common, but the tertiary form is the one most commonly met in the nasal space. *Ozæna* and disease of the cartilages and bones is the form generally noted. A peculiar manifestation called fibroid degeneration was first described in 1889 by Dr. J. N. MacKenzie, and has since received some notice by him, by Greville McDonald, and others. The turbinated bodies are the seat of the disease, and the description is of "dense, hard, whitish-yellow or red sessile masses—true fibroid polypi,"—requiring surgical treatment for their removal, and not to be confounded with gummata, which require only medical treatment. I have met a number of cases which have shown a peculiar condition which was not explained at the time, and which, in the light of recent experience, seem to be rather uncommon variations of the manifestations of syphilis.

A case will illustrate :

Mr. — had all the signs and symptoms of a suddenly acute

aggravation of hypertrophic rhinitis and nasal respiration so nearly impossible as to demand radical measures.

The removal of a septal ridge and hypertrophic mucous membrane covering the turbinated bodies by means of saw, scissors, and galvano-cautery, one side at a time, was followed by entire relief. Similar symptoms returned in about a month, and examination showed a picture similar to that presented before, only that the hypertrophy was less dense and confined to the turbinated bodies. Anti-syphilitic treatment relieved the second attack within a short time.

Upon reviewing the case I am led to question whether the same anti-syphilitic treatment would not have given relief in the first place. The septal spur surely required surgical attention, as contact was marked.

This and several other cases have given me ground for belief in a rapid hypertrophy of nasal mucous membrane, returning soon upon removal, and depending upon syphilis, even though unsuspected. I have not seen the "fibroid" characteristic plainly marked, but it might be described, perhaps, as pseudo-hypertrophy. I have noted a number of cases in recent literature of the sudden inexplicable return of nasal obstruction surgically removed; I would like to suggest that possibly these were examples of pseudo-hypertrophy of specific origin.

Another point which has appealed strongly to me is that these manifestations are separated by years of time from the primary infection. In one case fifteen years had elapsed with no manifestation until this sudden nasal involvement.

Another case denied ever having had any sign of infection, but admitted having often had gonorrhea in his early years.

I find that others have noted the appearance of tertiary symptoms years after exposure, without any secondary symptoms having appeared.

Syphilis of the nose is generally associated with similar manifestations in the pharynx and other immediate organs, but may exist alone.

Syphilitic ulceration of the nose is common ; its location is generally upon the septum, less often on the turbinated bodies. For this ulceration (tertiary) all standard authorities seem to agree that when cauterization is at all advisable crude nitrate of silver is the best substance. My experience is entirely in favor of the electric galvano-cautery, as being cleaner, more sharply defined in its application, productive of fully as speedy results, and in my experience far more agreeable to the patient. My method is to use the white-hot point, in very superficial and instantaneous touches, to the surface of the cleansed ulcer ; so light is this touch as often to amount to the mere radiation of heat from the burner.

This cauterization may be repeated as often as necessary until healing takes place. For the treatment of the hypertrophy above mentioned I should advise the ordinary surgical methods when indicated, but should be very chary in repeating the more radical operations, at least until internal remedies had been thoroughly tested.

Internal treatment is demanded, and adds much even to the success of our operative procedures. For this rapid hypertrophy we must produce rapid results, and it is generally attained by doses of 15 or 20 drops of the saturated solution of potassium iodide taken with meals, and followed up for several days. As soon as possible the *ix*, in 5-grain doses, may be substituted, and be followed by *aurum*, *aur. mur. et natr.*, *acid nit.*, *kali chlor.*, *merc.*, and other indicated remedies.

## AURAL MESSAGE.

BY E. J. BISSELL, M. D., ROCHESTER, N. Y.

Aural massage of the character now known as vibratory motion, and produced by transmitting sound of varying pitch and intensity directly into the ear, has come to stay. While there is yet much to learn, enough has been proven to demonstrate its great value in treating catarrhal deafness and tinnitus. Its superiority over all other methods of treatment for some cases is an established fact. This adjuvant in aural therapeutics is gradually gaining in favor. This slow advancement is propitious, for if it had suddenly and brilliantly flashed upon the medical horizon it might have suffered the same fate of most "cure-all" drugs—to-day they are, but to-morrow they are no more.

The application of the principle of massage is dependent upon more or less complicated instruments. Naturally these were far from perfect at first, and the principle involved might have been condemned simply because of imperfect appliances. The question therefore is now largely one of perfected instrumentation. Necessity is the mother of invention, and of late several instruments have appeared upon the market, each having some feature of merit, but no one meeting all requirements nor adapted to the diversified conditions which chronic catarrhal deafness presents. The longer I experiment in this field the more I am convinced that no one method of producing massage is suited to all cases, and whatever method is employed must be susceptible of great modification. Perhaps in time we will have an instrument possessing all the essentials for giving scientific aural massage.

This is an age of electricity, or rather of utilizing its power, and for a long time I have entertained the idea that perhaps this subtle agent might prove to be of great value along this line. For more than a year, in addition to my vibrometer and orguinette, I have used a telephone receiver placed against the ear and connected with a common faradic battery. Occasionally a case would be decidedly helped, but its sphere of usefulness seemed quite limited until about four months ago, when I procured a Goelet faradic battery, and since that time I have had a number of very satisfactory results in increasing the hearing and stopping tinnitus. I shall not attempt to answer the question why one instrument more than another seems suited to a particular case, but such is the fact. It will serve my present purpose to simply describe my method of using the principle involved in the telephone receiver when connected to a faradic battery capable of a great range in the number of "makes and breaks" per minute.

The Goelet battery, made by the Galvano-Faradic Co. of New York, possesses some new and remarkable features which render it especially useful to the oculist or aurist, and particularly adapted for producing a great range of vibrations in the diaphragm of the telephone receiver. In the main these features are: First, three secondary coils of different size wire and so arranged as to bring into use seven different lengths of wire. Second, a rheostat placed in the circuit operating the primary coil. This regulates the smoothness and number of interruptions, and renders it possible to increase the current gradually. Third, and most important, a thin metal ribbon rheotome seven inches long and so arranged that the tension can be increased or diminished, like a wire string on a banjo. This with an ordinary slow rheotome upon the battery gives a range of interruptions of from sixty to twenty thousand per minute.

From the above brief description it can be seen that when a telephone receiver is attached by ordinary cords to the binding-posts of *this* battery the number of vibrations of the diaphragm and the intensity of sound are sus-

ceptible of greater variation than can be secured from any other battery. By this arrangement only one ear can be treated at the same time. Occasionally it is an advantage, but when both ears require treatment it consumes considerable time. To overcome this difficulty I have had constructed a small cabinet within which is an instrument involving the principle of the telephone receiver, and from which comes a large tapering tube ending like a stethoscope. The quality and intensity of sound are somewhat modified by this device, but it works very satisfactorily. There are cases, however, requiring great power, and I find it best to resort to my original plan of placing the receiver tightly against the ear.

The advantages of the above method of giving massage are: First, the only noise heard, except by the patient, is that produced by the humming of any ordinary faradic battery. This is quite an advantage over the vibrometer, which is a very noisy instrument. Second, if the battery is operated by Leclanché cells it is always ready to use, and is seldom if ever out of order. Third, in the present state of medical electricity every specialist should possess the best battery procurable, and the extra expense to adapt it for aural massage is very small.

This instrument in its present state of development cannot supplant the vibrometer and other instruments, but in many cases it will do what they do, and in my hands it has occasionally accomplished what they failed to do.

## GUNSHOT WOUND OF THE LEFT EYE, WITH LOSS OF VISION OF THE RIGHT EYE.

BY CHAS. C. BOYLE, M. D., NEW YORK.

The following interesting case came under my care at the Hahnemann Hospital :

The patient, a young man about eighteen years of age, was admitted to the hospital suffering from a gunshot wound of the left eye, caused by the accidental discharge of a Flobert rifle while in the act of looking down the barrel.

When I first saw him there was marked swelling of the eyelids and chemosis of the conjunctiva ; there was some proptosis, and the eyeball was tender to touch, it being in the active stage of panophthalmitis. There was strabismus convergens of the right eye, accompanied by loss of sight. Ophthalmoscopic examination revealed a slight neuro-retinitis.

In spite of the fact that the injured eye was in the active stage of panophthalmitis I deemed it advisable to enucleate it, as there was a possibility of the bullet being in the eyeball, and, by its irritation, causing blindness of the right eye, although there were symptoms present which indicated pretty strongly that the ball was lodged in the brain.

Ether was administered, and the eye enucleated, when it was discovered that, after piercing the center of the cornea, the bullet had passed directly through the eye, leaving it at the optic nerve entrance, severing the nerve completely. The location of the ball was at this time merely a matter of conjecture, but we were satisfied that it was within the cranial cavity.

After the removal of the injured eye the patient experienced considerable relief from pain which the inflamed eye had excited. On the following day, however, he had several convulsions, fol-

flowed by paralysis of the left lower extremity, although he remained conscious a greater part of the time.

He lingered along for a week, during which time his temperature gradually rose to  $101\frac{1}{2}$ , at which point it remained until his death. His pulse was 146, respiration 6, and breathing stertorous.

For the following notes, taken at the autopsy, I am indebted to Dr. Harrington, assistant house surgeon of the hospital.

On opening the cranial cavity the dura mater was found to be intact, though much congested and inflamed at a point just anterior to the lambdoidal suture on the right side. There was also considerable fluid within the dura mater. The membranes were next divided and the brain removed. It was then found that the bullet, after leaving the eyeball, had passed through the orbit about a quarter of an inch to the right of the optic foramen, and then taking a direction diagonally to the right, passed through the body of the sphenoid bone, emerging at the posterior clinoid process of the sella Turcica, which was fractured. It was then deflected to the right, passing under the right optic nerve, in front of the chiasm, then across through the middle and posterior lobe of the brain, and was found resting against the posterior part of the inner table of the right parietal bone.

The brain substance had undergone extensive degeneration, and was very soft, especially on the right side. Both lateral ventricles were filled with blood which was undergoing degeneration. There was a dense clot underneath, and pressing upon the third, fourth, sixth, and optic nerves, in front of the chiasm, this being undoubtedly the lesion causing blindness, and convergent strabismus of the right eye; there was also a large clot of blood in the region of the medulla.

CONGENITAL SYPHILITIC ADHESIONS, INVOLVING THE PALATE, SEPTUM, NASOPHARYNX, POSTERIOR PHARYNGEAL WALL, FAUCES, EPIGLOTTIS, AND LARYNX.

BY J. OSCOE CHASE, M. D., NEW YORK.

A case of unusual interest came under my observation at the throat clinic in the New York Ophthalmic Hospital.

H. W., female, single, aged thirty-one years, on October 30, 1893, applied to Dr. J. M. Schley's clinic for treatment, and being assigned to my division, I obtained the following history :

The patient probably contracted syphilis at birth, as her parentage was disreputable ; at any rate she has been frequently exposed and the history is clear.

The eyes and throat were sore when she was quite young, and the sight of the right eye was completely lost at four years of age. The eye Dr. Deady examined and pronounced it to be a case of buphthalmos, which affection, according to Dr. G. E. de Schweinitz in Keating's "Cyclopedia of the Diseases of Children," appears at birth or shortly afterward, and its incipient stages are believed to be intra-uterine.

The patient could breathe through the nose with difficulty before losing the eyesight ; but shortly after this the nares became completely occluded, and have remained so to the present time. At fourteen a large abscess appeared on the left side of the inferior maxilla ; three teeth were extracted at the time, but the abscess broke externally, leaving a large scar ; at the same time an ulcer simulating the tertiary variety, about the size of the bottom of a tumbler, appeared on the dorsal surface of the right foot, near the toes, and remained seven months. After

this a lump about the size of a marble appeared in the left eyebrow, was lanced, but remained sore for a long time. At the age of sixteen a large, hard lump about the size of a hen's egg appeared in the left axilla. Under medication this soon disappeared. At about twenty-three (eight years ago) she entered a New York hospital and had her throat operated upon five times during a period of from four to six weeks, without benefit. Four years later she had pneumonia. To quote her stepmother: "She has always been afflicted with sickness, and is continually applying for treatment at the different dispensaries."

Her voice is coarse and husky, at times almost aphonic; and after a fresh cold she is frequently obliged to get up at night to prevent choking. Upon examination the teeth present a black, rotten, broken down condition; the fauces are almost obstructed by cicatricial tissue, and there are extensive adhesions uniting the soft palate to the posterior pharyngeal wall, causing complete obstruction of the posterior nares. The uvula is wanting, and just to the right of the median line a band of thick tissue, resembling gristle, unites the soft palate to the dorsum of the tongue and extends to the right tonsil. Posterior to this a curved probe can be passed half an inch to the right. At the left of the median line the posterior surface of the tongue is united by adhesions to the posterior and left lateral walls of the pharynx, thus making the opening into the larynx and esophagus very small. Nothing can be revealed by the laryngoscope, although an ordinary laryngeal applicator can be introduced without difficulty. An anterior rhinoscopic examination revealed a large perforation of the bony septum, the cartilaginous part not being affected.

Now the question arises, What can be done to relieve or palliate this trouble? The various operations already resorted to have resulted in adding more cicatricial tissue. Thus very little can be hoped for by further operative measures. Under the advice of Dr. Schley I have been dilating the constricted pharynx and glottis without as yet gaining any permanent ground. The sheath of adhesions which unite the tongue to the soft palate and right tonsil I expect to sever with the galvano-cautery knife, having already cut through a portion of the tissue, thus relieving the tongue and giving more room for deglutition. After this all that can be hoped for is to increase the caliber of the pharynx

by slitting or severing the lateral adhesions with the cautery knife, and frequently dilating until this heals.

The question has been asked whether breathing could not be established through the nares. Unsuccessful operations have been performed with this end in view, and in order to make a permanent opening in the posterior nares it will necessitate a dissection of nearly all the soft palate with the tissue adhering to the vault and posterior pharyngeal wall, resulting in leaving the patient in a much worse condition.

Internally kali iod., saturated solution, gtts. v., t. i. d., was administered, it not being thought advisable to push the drug to the point of toleration, as she has undoubtedly taken it in large doses from time to time.

## TREATMENT OF HYPERTROPHIED TONSILS.

BY S. C. DELAP, M. D., KANSAS CITY, MO.

Among old school physicians there is no dissent as to constitutional or local treatment of hypertrophied tonsils, but among homeopaths the mode of practice is widely divergent. In speaking of hypertrophied tonsils I restrict the term to those chronic enlargements that are properly placed in this class. As stated by Bosworth, hypertrophy includes two conditions, one wherein the lymphoid cells of the tonsil are enormously increased in number; the other, the hyperplastic form, in which there is a larger proportionate development of the cellular tissue elements of the organ. In the first the tonsil is soft to the touch and usually reddened in color, while in hyperplasia it is hard to the touch and normal in color. The question simply resolves itself into this, Can we, with homeopathic remedies, reduce to normal size a chronically enlarged tonsil, or should some mode of removal be practiced? Normally, nature performs this duty by commencing a retrogressive process at puberty and completing it by the time adult life is reached. If the child does not suffer from the delay it might be well to let Nature attempt the work in her own way. But we frequently become aware of the fact that the child does suffer, that this condition predisposes to such disease as acute tonsilitis and diphtheria, and life is often endangered by a complication of other diseases through obstruction to normal respiration. In an examination of the literature of the subject I am informed that such remedies as baryta, calcaria, mercurius, etc., will reduce

these organs to a normal condition, and that it has frequently been done. While loath to believe that any misstatement of fact is intended, I am forced to the conclusion that true hypertrophy has been mistaken for an acute or chronic inflammatory condition, or that there is a vitiated link in the chain of testimony. All cases that I have heard stated, or read in homeopathic literature, lack the necessary details that alone give scientific weight to evidence. The homeopath has so many just claims for remedies properly prescribed that he can ill afford to cast suspicion on his cause by making one of such dubious pretensions. As a homeopath I have tried long and laboriously to avoid operation and secure atrophy by remedies given according to the law of similia, but I must confess that I have lost absolutely all faith in the procedure. My experience with removal of these organs by operation is so incomparably superior to that of medication that I am a complete convert to abscission.

In the year 10 of this era Celsus speaks of the operation for removal of the tonsils in such a familiar way that the inference is natural that the operation was a very common one, yet it is the first intelligent reference to the subject in medical literature. From that time tonsilotomy was practiced, and not infrequent references are made to it down to the beginning of that period when all scientific learning was hushed in the sleep of death by the requiem of the priest. From the beginning of the seventeenth to the middle of the eighteenth century, while the Puritan was settling New England and Americans were getting ready for the divorce of Church and state, not a single tonsil was removed. Science had been dead, but revolutionary ideas brought about a resurrection; and with that of other branches of knowledge medicine and surgery were again practiced in the dawning light of intelligence. In 1754, two years after Samuel Hahnemann was born, Caqué, a Frenchman, proclaimed the propriety, safety, and excellent results of excising the tonsils, and the operation soon became general. With this little digression into the his-

tory of tonsilotomy a more comprehensive view may be taken. It is thus shown not to be a new fad of the specialist.

Various methods of removal have been practiced, as well as a number of local applications looking to atrophy and a return to normal limits. For the latter purpose various astringents have been recommended. Caustics, such as chromic and nitric acid, nitrate of silver, chloride of zinc, and other escharotics, together with the actual and galvanic cautery, have the sanction of authority. Each of these methods, in certain cases, has its advocates to-day, except that the actual cautery has given way to the hot wire. Modes of removal are also numerous. Among the instruments most frequently used are the snare, bistoury, scissors, and tonsillitome. As the tonsillitome is now generally recommended, there may be found in the market various forms of the original devised by Dr. Physick of Philadelphia.

But why perform the operation even if medication and local applications fail to produce atrophy? Without any facts to sustain the objection it has been asserted by Penrose and others that excision leads to sterility. What of an objection these days without facts to substantiate it? On the other hand, Chassaignac has cited data that to go prove that removal of the tonsil promotes fecundity—a very logical conclusion when it is recollected how such patients improve in general health afterward. The question of hemorrhage does not apply to children, as not a single case of dangerous hemorrhage has ever been recorded as occurring in a child. In adults hemorrhage may be wholly avoided by using the snare. It has been urged that the tonsil was placed in the throat for a purpose. Without attempting to settle the question of its origin it may suffice to say that the tonsil is an organ of childhood and little trace of it remains in the healthy adult. Its function is to secrete and exude a substance that lubricates the throat, a function that is much better performed by various other glands. In hypertrophy its function is wholly abnormal, and the organ no longer serves a useful purpose.

The most weighty objection is the fact that it is an operation. In the great majority of instances it is the child that becomes the patient. Parents revolt against an operation. But when it is recollected that the tonsil is not at all a sensitive organ, especially in hypertrophy, and that cocaine abolishes nearly all pain, this objection loses much of its force among the intelligent.

Removal of the hypertrophied tonsil has many advantages, the most pronounced being that of improved health. I have seen unhealthy children assume a new rôle in life after operation. The recurring attacks of acute tonsillitis ceased entirely, nutrition greatly improved, lethargy and indifference gave way to sprightliness and interest, especially in school children, and a feeble child was transformed into one of health and endurance.

As all are aware, the tonsil is made up of the same tissue as that which constitutes a lymphatic gland. These structures are very liable to enlargement or hypertrophy, even independent of a constitutional dyscrasia or scrofula, whatever specific condition that may mean. Enlarged tonsils are found in fairly healthy children; but of course more frequently in the cachectic. Repeated inflammatory conditions are very apt to leave an enlarged tonsil, as well as lymphatic glands. The tonsil in the foetus results from the epiblastic layer which forms the mouth meeting and forming an invagination with the hypoblastic layer which forms the alimentary canal. This invagination is followed by secondary invagination, and thus is formed the lacunæ or crypts of the tonsil. These are usually ten to fifteen in number, and the epithelium being impinged upon by the development of the hypoblastic layer, loses its cylindrical character, as found in muciparous glands, together with its function of secretion, so that only a minute amount is poured out, sufficient only to moisten the surface of the gland. But these crypts fill with epithelial débris, and probably food particles, till each crypt becomes a cesspool of a most putrescent character. In coughing these are often expelled like a grain of wheat in size and appearance. If anyone

has mashed these between the finger and noticed the odor it will not be necessary to dwell upon the infecting nature and putrescent character of these masses. In swallowing they often pass into the stomach and must necessarily add to the impairment of the general health. Spoiling the breath and impairing nutrition are alone sufficient to demand extirpation. These crypts are undoubtedly foci where germs of disease, especially diphtheria, find a congenial habitat, and develop, and the individual is thus made more susceptible to diphtheria, follicular ulceration of the tonsils, etc.

The size of the tonsil, with a frequent concomitant enlargement of the naso-pharyngeal structure, often impedes respiration to such a degree that mouth breathing, especially during sleep, becomes a necessity. Aside from its effect upon the throat, long-continued impeded respiration leads to improper aëration of the blood, induces weakened resistance to constitutional disease, and especially predisposes to pulmonary affections.

## THE CANALICULATOME.

BY CHAS. C. BOYLE, M. D., NEW YORK.

Having become convinced some time ago that it was a bad practice to slit up the canaliculus in cases of stricture, and having met with cases which it was impossible to cure by the use of probes or the electrolytic action of the galvanic current, I was led to devise an instrument by which I could incise them, and still preserve the canaliculus, which, by its capillary attraction and syphonage, plays such an important part in carrying off the tears.



The above cut is a very good representation of the instrument, which was made under my direction by the well-known surgical instrument makers W. F. Ford Surgical Instrument Co.

The instrument consists of an aluminum handle, at one end of which is fastened, by means of a small thumb-screw, a slightly curved, slender steel cylinder containing a groove on its concavity, in which the knife slides. The cylinder is about the size of a No. 3 Bowman's probe, and terminates in a delicate triangular sheath for the knife, the extremity of the sheath ending in a fine blunt point.

The cut shows the knife exposed to view.

In using the instrument the knife is sheathed, and the point is introduced into the punctum, its shape being such that, by exerting gentle pressure, it may be made to pass through the smallest punctum without tearing or cutting ;

it is then carried along in the same manner as an ordinary probe until it passes the stricture, whereupon, the handle being grasped firmly in order to steady it, the slide button near the handle is drawn backward, unsheathing the knife, and at the same time cutting the stricture. The slide button is then pushed back to its original position, sheathing the knife, when, if necessary, the instrument may be rotated and the stricture again incised in another direction, or it may be withdrawn and the probes passed.

## LARYNGITIS IN FEMALES.

BY THOMAS M. STEWART, M. D., CINCINNATI, O.

This is a subject no doubt quite familiar to most laryngologists, but its inadequate treatment in the text-books upon diseases of women shows it is one not fully appreciated by the gynecologist. However, a somewhat extended experience with the subject in cases having already consulted specialists may be sufficient reason for again directing attention to it.

I have particularly observed the quality of the voice in vocalists presenting themselves for treatment during the menstrual period, and have noted at these times the voice to be husky in character. Such cases are among the most difficult to manage successfully. The study of this reflex through the medium of the sympathetic nervous system is interesting and important, but it is not necessary in this connection to do more than mention the fact. My point is that if good singers have themselves noted this derangement of the vocal apparatus at their regular monthly periods, then it seems reasonable that congestion of the pelvic organs at other times will also derange the vocal organs.

We conclude from this that it is wise to restrict the use of the voice during the menstrual periods, and to institute proper treatment if the condition of the pelvic organs is among the exciting causes of laryngeal inflammation. No doubt gynecologists have met with cases in which laryngeal spasm followed applications to the endometrium, and have noted that as the pelvic irritation progressed

toward cure these spasms became less violent. There are many cases on record in which the exciting cause of laryngeal symptoms has been found to be in the pile-bearing inch, which but corroborates the influence of the pelvic organs over the vocal apparatus.

The following cases more fully bear out the foregoing statements :

CASE I. This case, a noted vocalist in this vicinity, was referred to my care because she had noticed a marked failure in her voice. Her voice had gradually lost in purity of tone and lessened in its range. The objective laryngeal symptoms did not fully satisfy me as to the cause. Inquiry into the general health determined me to request her physician to examine for pelvic derangement. His examination disclosed the fact that she was suffering from an ante flexion and endometritis. These troubles were treated. Upon recovery she reported to me that she sang with greater ease, and had not only regained the former purity of tone, but had also gained a full tone in the upper register. The latter she partly attributes to some special instruction given her as to vocalization, an art in which I thought some suggestions were needed. That this latter instruction did not have all to do with her recovery I am satisfied, because of attempting improvement in that direction before finally getting at the basic cause.

CASE II. Married woman, aged thirty-eight years. Case referred to a gynecologist, who made a diagnosis of uterine fibroid. During his treatment of the case he had occasion to treat the endometrium, and his applications to it were always accompanied by severe laryngeal spasms.

I am further informed by this same physician that he has noticed these spasms in other cases, and reports some incidents of pain in the larynx during treatment applied to the endometrium.

## REPORT ON THE OPHTHALMOPLEGIAS.\*

BY DR. H. ARMAIGNAC, BORDEAUX, FRANCE.

*(Continued from page 369).*

With regard to the cause of paralyses of the ocular muscles, it may reside in the muscle itself, in the tract of the nerve which supplies it, or at any point between its entrance into the muscle and its intra-cerebral origin.

In place of descending from the brain toward the muscles, unlike all other authors, it appears to me more natural to ascend from the muscle to the brain. In fact, we well know where the nerves terminate; but we do not know exactly where they commence, for, beyond some supposed nuclei of origin, all is vague and unknown.

After the example of preceding authors, but proceeding in an inverse manner, as I have said, I shall divide the ophthalmoplegias into: (1) *Orbital*, (2) *basal*, (3) *fascicular*, (4) *nuclear*, (5) *cortical*.

But before describing each of these in particular, it is necessary to give a summary description of the oculo-motor nerves from their termination to their nuclei of origin.

### ANATOMY OF THE OCULO-MOTOR NERVES AND OF THEIR NUCLEI OF ORIGIN.

The oculo-motor nerves are well isolated from their entrance into the muscles up to their points of emergence from the brain, but this is not true after they penetrate into the substance of this organ. The fasciculi, before attaining the nuclei of origin, often follow a track that is

\* Presented at the tenth session of the Société Française D'Ophtalmologie, Paris, 1892.

very difficult to determine for some of them—the patheticus, for example; nevertheless the majority of the best anatomists are to-day in accord on the intra-cerebral tract of the fasciculi of origin of the cranial nerves.

We know very little of the ophthalmoplegia which has for its origin a lesion involving the radiating fibers, but, for the clearness of the subject and for the intelligence of what follows, I shall briefly examine the present state of our anatomical knowledge of the course and origin of the third, fourth, and sixth pairs.

1. *Common oculo-motor nerve*.—This nerve, considered from its termination to its origin, penetrates into the cranial cavity by the larger part of the sphenoidal fissure, engages in the external wall of the cavernous sinus, attains the posterior clinoid apophysis, is directed from in front inward and downward and arrives in the inter-peduncular space on the inner side of the cerebral peduncle, in front of and external to the bridge of Varolius, where it divides into ten or twelve roots which dip into the thickness of the base of the peduncle. These roots pass into the black substance of Sömmering, traverse the nucleus tegmenti, turn the peduncle of the quadrigeminal body (Fig. 1), reunite and terminate at a group of nuclei of ganglionic cells situated under the floor of the aqueduct of Silvius, what we call the nuclei of the common oculo-motor nerve.

*Nucleus of the common oculo-motor*.—This nucleus is not, as might be believed, a simple mass of ganglionic cells, but is composed of a series of groups arranged along the median line of the aqueduct; over an extent of twenty millimeters according to some, of only ten millimeters according to Perlia, of Frankfort, who has published an important work on this subject in *Græfe's Archives*, and to whom we owe the following complete and most recent anatomical description of this nucleus:

“The groups of ganglionic cells which constitute the nucleus of the common oculo-motor are situated under the floor of the third and of the fourth ventricle over an extent of ten millimeters in the antero-posterior direction.

"Taken as a whole, the groups of the nucleus have a pyriform aspect with the point directed downward. Its upper, or anterior, extremity nearly reaches the anterior extremity of the quadrigeminal lamina. Its inferior extremity is

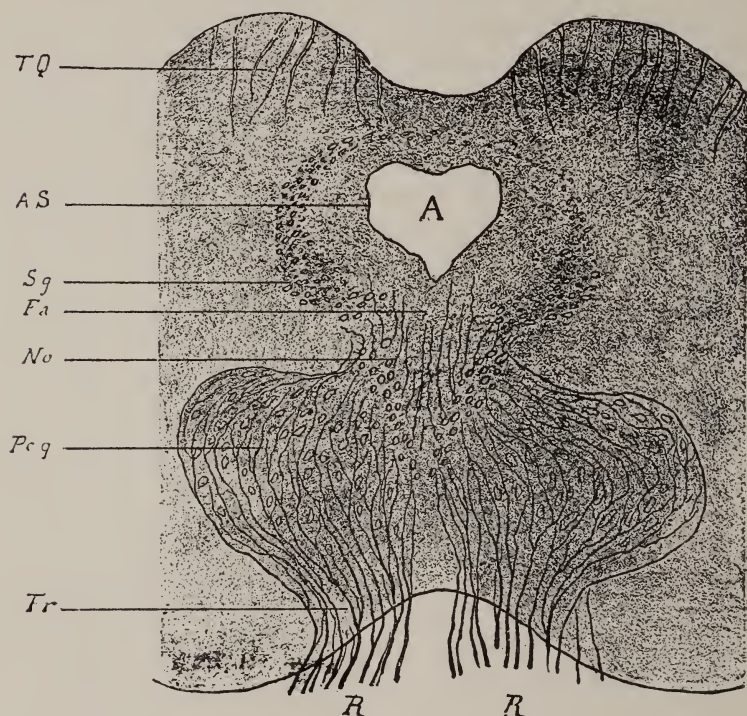


FIG. 1.—Frontal section at the level of the posterior part of the anterior quadrigeminal bodies.

*TQ*, Anterior quadrigeminal bodies.

*AS*, Aqueduct of Sylvius.

*Sg*, Gray substance around the aqueduct.

*Fa*, Nerve fibers directed toward the gray substance.

*No*, Nucleus of the common oculo-motor.

*Pcq*, Peduncle of the quadrigeminal bodies.

*Fr*, Fasciculi of the roots of the third pair.

*R, R*, Roots of the third pair.

found almost on a vertical plane passing by the posterior extremity of the anterior quadrigeminal tubercles."

From the various groups of cells which constitute the nucleus of the common oculo-motor arise fasciculi which,

after their exit from the isthmus, constitute the roots of the third pair of nerves. The greatest part of these fasciculi are directed through the fibers of the longitudinal fasciculi and reunite in larger fasciculi, while others are directed obliquely toward the median line and decussate with those of the opposite side (Merkel). Gudden was the first (1882 and 1883) to establish the experimental proof of this decussation.

To have a complete idea of the conformation of the group of cells which constitute the nucleus of the third pair, we must make a horizontal antero-posterior section of the nuclear region and a series of frontal sections from before backward and perpendicular to the first. On the first, as well as the second, the section of the nucleus affects a triangular form, with base anterior in the first case and base superior in the second. The nuclei are then disposed in several layers.

If we consider first the horizontal section (Fig. 2), we find in front and laterally the anterior nucleus 1. This nucleus is isolated and quite separate from the others. The fifth frontal section, from Perlia, which cuts through its anterior part, does not meet the others, but the fourth section meets both the posterior part of this nucleus and the anterior part of another of the small cells situated a little more posterior and inward, and which we designate as the anterior median nucleus.

A little farther back from the latter we find another nucleus of small cells in form of a cross, designated as the nucleus of Edinger-Westphal.

This nucleus, discovered by Edinger, has been described by Westphal as being the center of innervation of the internal muscles of the eye, because it was found normal in the autopsy of a case of progressive external ophthalmoplegia.

Inward and slightly posterior to the nucleus of Edinger-Westphal, on the median line, we find an odd (unpaired) nucleus of large cells, which Perlia designates under the name of the *central nucleus*.

Still farther backward and outward, we find the posterior lateral nuclei, to the number of four on each side; two dorsal and two ventral. The nuclei of the patheticus come immediately after and without line of demarcation.

The fibers which arise from the cell prolongations of the two ventral nuclei, from the anterior dorsal nucleus and

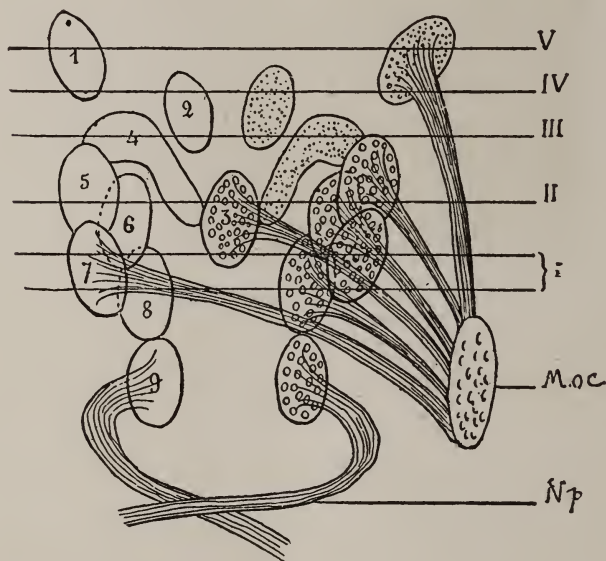


FIG. 2.—Antero-posterior section of the nuclei of the third pair (Perlia's Schema).

I, II, III, IV, V, First, second, third, fourth, fifth frontal section from behind forward.

Moc, Common oculo-motor nerve.

Np, Pathetic nerve.

1, Anterior lateral nucleus.

2, Anterior median nucleus.

3, Central nucleus.

4, Nucleus of Edinger-Westphal.

5, Anterior dorsal nucleus.

6, Anterior ventral nucleus.

7, Posterior dorsal nucleus.

8, Posterior ventral nucleus.

9, Nucleus of the pathetic.

anterior lateral nucleus are *direct*; they unite in secondary fasciculi which, with other fibers from the central nucleus, constitute the nerve roots of the common oculo-motor of the corresponding side.

The fibers arising from the posterior dorsal nucleus of

each side are directed toward the median line, and are united with the nerve fibers from the nuclei of this side.

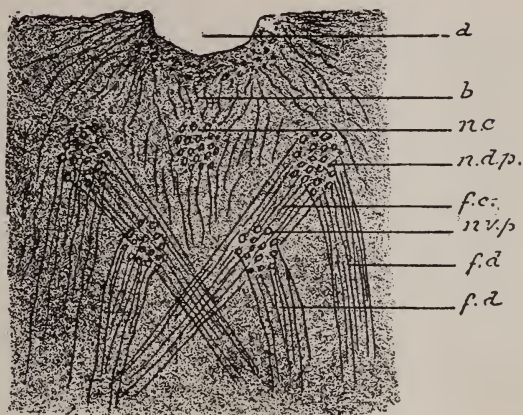


FIG. 3.—Posterior frontal section I.

*a*, Aqueduct of Sylvius.

*b*, Fibers directed from the nucleus toward the gray substance.

*nc*, Central nucleus.

*ndp*, Posterior dorsal nucleus.

*fc*, Crossed fasciculi from the posterior dorsal nucleus.

*nvp*, Posterior ventral nucleus.

*fd*, Direct root fibers from the third pair.

There is, then, a partial decussation of the fibers of origin of the third pair (Fig. 3).

On the frontal section, which passes near the posterior third of the nucleus, we see the end of the nucleus of Westphal, which appears in the upper third as a group of small cells contained in a nest, the central nucleus on the median line, and, on the sides, the anterior dorsal nucleus and the anterior ventral nucleus (Fig. 4). On the side is seen the section of the posterior longitudinal *bandelette*. Here all the fibers issuing from the nuclei are direct.

The third section, from Perlia, traverses the anterior part of the nucleus of Edinger-Westphal and the posterior part of the anterior median nucleus.

The fourth section traverses the anterior median nucleus and the anterior lateral nucleus (Fig. 5).

Finally, the fifth section cuts through only the anterior lateral nucleus.

According to Darkschewitsch (1), the fibers of the posterior commissure of the brain concur in the formation of a



FIG. 4.—Frontal Section II.

*a*, Aqueduct of Silvius.

*b*, Nerve fibers directed from the nucleus toward the gray substance around the aqueduct.

*new*, Nucleus of Edinger-Westphal.

*nda*, Anterior dorsal nucleus.

*nc*, Central nucleus.

*nva*, Anterior ventral nucleus.

*llp*, Posterior longitudinal bandelette.

*fd*, Direct fibers of the third nerve.

tract by which the luminous excitations are transmitted from the retina to the nucleus of the third pair. The an-

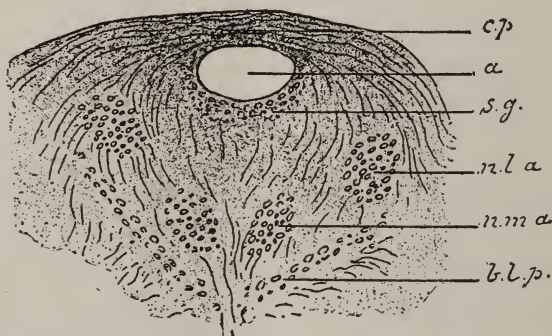


FIG. 5.—Frontal section III.

*cp*, Posterior commissure.

*a*, Aqueduct of Silvius.

*sg*, Gray substance around the aqueduct.

*nla*, Anterior lateral nucleus.

*nma*, Anterior median nucleus.

*b.l.p*, Posterior longitudinal bandelette.

terior lateral nucleus would be, according to this, the center of the pupillary reflex.

The nucleus of the common oculo-motor appears to have important connections with the posterior longitudinal *bandelette*, the section of which is seen in the illustrations, but of the origin and termination of which we are yet ignorant, although Forel thinks that it stops at the posterior commissure of the brain, while Meynert believes that it is prolonged to the inferior face of the lenticular nucleus and even farther yet to the cortex.

Perlia says that the *bandelette* receives fibers from the posterior part of the nucleus of the third pair, and Duval and Laborde admit that the most internal fibers of the *bandelette* come from the external oculo-motor, decussating and going to join fibers of the common oculo-motor of the opposite side, serving to innervate the internal rectus muscle in its associated movements.

In sum, the assemblage of ganglionic cells which constitute the nucleus of the third pair is composed of two groups: 1. A principal posterior group containing four nuclei, lateral pairs, and an odd central nucleus, all having large cells, and the pair of nuclei of Edinger-Westphal, which has small cells. 2. An anterior group containing only two pairs of nuclei having small cells—the anterior lateral nucleus and the anterior median nucleus.

According to Perlia, each branch of the common oculo-motor should, without doubt, have its origin in a special nucleus, but they are so mingled and entangled with one another that it appears scarcely possible to know which one serves as the origin of each of the nerve branches of the third pair. It is presumed, however, especially from the experiments of Hensen and Völckers and the works of Kähler and Pick and von Gudden, that the different ganglionic groups of the common oculo-motor, although so close together, or even contiguous, constitute, nevertheless, so many distinct centers for the different muscles supplied by this nerve trunk.

Besides the nerve fibers which leave the nuclei to constitute the roots of the third pair, we also find a great number of other very fine fibers which arise from the upper part of

the nucleus and are directed vertically toward the gray substance of the wall of the aqueduct.

We do not yet know what becomes of these fibers, but it may be presumed that their rôle cannot be neglected

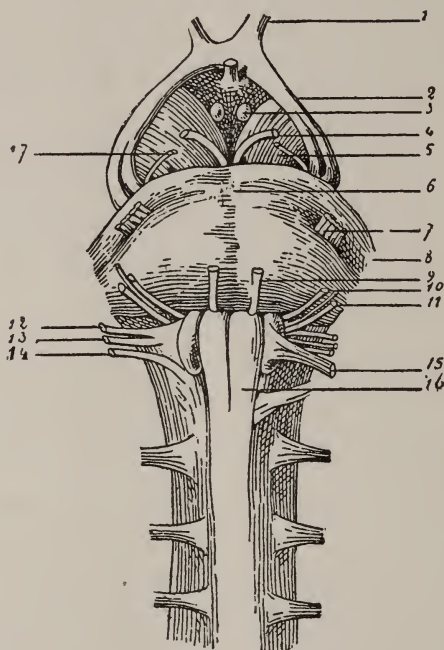


FIG. 6

- 1, Optic nerve.
- 2, Optic tract.
- 3, Mamillary tubercle.
- 4, Common oculo-motor nerve.
- 5, Cerebral peduncle.
- 6, Bridge of Varolius.
- 7, Trigeminal nerve.
- 8, Origin of the middle cerebellar peduncle.

- 9, External oculo-motor.
- 10, Facial nerve.
- 11, Acoustic nerve.
- 12, Glosso-pharyngeal.
- 13, Pneumogastric nerve.
- 14, Spinal nerve.
- 15, Great hypoglossal nerve.
- 16, Anterior pyramid.
- 17, Pathetic nerve.

because of their connections with the column of gray substance which surrounds the aqueduct, and the importance of which appears considerable.

To a late date there was established no line of demarcation between this pericavitary gray substance and the

nuclei of the third pair. Perlia is the only one, to my knowledge, who has clearly indicated this separation.

Mauthner only speaks incidentally of the partial decussation of the roots of the common oculo-motor, for he says that the nerves of the ocular muscles all have their nuclei of origin from the same side, and that total unilateral ophthalmoplegia is simply caused by a gradual affection of the ganglionic nuclei of the same side.

An interesting point in the anatomy of the nuclei of the third pair, and one which accounts for certain clinical varieties of ophthalmoplegia in which the internal or the external muscles are paralyzed separately, is its vascular supply; in fact, not only is the anterior group of nuclei separated from the posterior group, but it is supplied by a different artery, as first demonstrated by Duret and afterward by Heubner; the territory of the intrinsic muscles of the eye is supplied by the posterior communicating artery, while the posterior group of nuclei is nourished by the arteries from the basilar.

2. *The pathetic nerves* are the most slender of all the encephalic nerves. They also have the longest course in the interior of the cranium. In ascending from the termination in the superior oblique muscle to their origin we see them pass through the inner part of the sphenoidal fissure, pass over the whole length of the external wall of the cavernous sinus, traverse the middle part of the fold of dura mater which extends to the quadrilateral plate of the sphenoid, pass within the visceral leaf of the arachnoid and pia mater, and turn around the cerebral peduncle and the lateral parts of the protuberance. From here they are directed upward, backward, and inward to the posterior part of the posterior quadrigeminal tubercles, very near the median line, where they penetrate.

Each nerve in penetrating into the isthmus of the encephalon is divided into four or five roots, which pass between the posterior fibers of the triangular fasciculus of the isthmus, penetrate into the superior cerebellar peduncle, which they traverse, decussate, in the thickness of the

valve of Vieussens, with the fibers of the same nerve of the opposite side, and terminate, by turning around the aqueduct of Sylvius, in a nucleus of gray substance situated on the antero-lateral parts of the aqueduct, beneath the nucleus of the third pair, to which it is contiguous and intimately united. This union is such that M. Duval says: "The nucleus of the common oculo-motor is only the anterior part of a small longitudinal column of gray substance, of which the posterior part forms the nucleus of the patheticus."

The nucleus of the patheticus, like that of the third pair, receives anastomosing fibers from the nucleus of the sixth pair, by the intermediary of the posterior longitudinal bandelettes (M. Duval).

The pathetic nerve in its passage around the protuberance is accompanied by the superior cerebellar artery.

3. *External oculo-motor*.—The nerve of the sixth pair passes from the orbit into the cranium by the largest part of the sphenoidal fissure, penetrates into the cavernous sinus, through which it passes horizontally, traverses the most inferior fold of the dura mater, which extends to the quadrilateral plate of the sphenoid, and is carried obliquely backward, inward, and downward to the groove which separates the spinal bulb of the protuberance from the external border of the anterior pyramids.

Some of its extremely fine roots sink perpendicularly between the most internal fibers of the protuberance; others respond to the external half of the motor portion of the pyramids, into the thickness of which they plunge directly, to pass toward the floor of the fourth ventricle. It is in this last place, immediately above and external to the round eminence on the sides of the median groove, that we find the nucleus of its origin behind that of the trigeminal.

In its anterior part it is found in the angle of the facial, and it is crowded laterally by the ganglionic cells of the nucleus of the latter nerve, the cells of the two being confused (Merkel).

The tract of the fibers of the external oculo-motor, aside from their real origin, presents very interesting peculiarities; some fibers go directly, without crossing with those of the opposite side, to the apparent origin of the nerve; others undergo decussation on the median line in the thickness of the posterior longitudinal bandelettes (Huguenin, Duval, and Laborde), and are carried toward the nucleus of the common oculo-motor and of the patheticus of the opposite side. They join the most internal and inferior fibers which emerge from this nucleus.

In order that harmony may exist in the associated lateral movements it is then necessary that the same center preside over the contraction of the external rectus of one side and of the internal rectus of the other, but for the movements of convergence both internal recti should be able to contract together; the same is true of the two external recti for movements of divergence. As we see, these diverse combinations of associated or independent movements demand particular centers for each muscle, and anastomoses designed to assure the collaboration of these centers in the lateral associated movements. Each internal rectus is then innervated by two different nuclei, and the proof is found in the interesting fact noted by M. Gad, that with associated paralysis the movements may still be executed by the eye of the paralyzed side when one excludes the other (that of which the external rectus has lost its power). For example, if a patient has both eyes deviated to the right, his internal rectus will not act, because the left external rectus is paralyzed; but it will immediately enter into play by the aid of its special motor function if we exclude the left eye.

Thanks to this anatomical disposition, the internal recti are placed under the influence of a double innervation, one inducing the movements of convergence, the other the lateral associated movements. The simultaneous rotation of both ocular globes to the right is produced, then, by a propulsion from the nucleus of the right external oculo-motor, the rotation to the left by an impulsion

arising from the nucleus of the left external oculo-motor (Duval).

Apropos of the external oculo-motor, I believe it useful to note here an anomaly described first by Pourfour du Petit, and since then by Otto, Grant, Louget, Cruveilhier, etc., and which consists, in some instances, of a small thread that this nerve furnishes to the ophthalmic ganglion, sometimes of an anastomotic branch which unites the nerves of the sixth pair and of the third pair in their track in the cavernous sinus. This very rare fact explains cases where paralysis of the external rectus is associated with paralysis of the sphincter of the iris (Sichel), and others, without doubt, where basilar paralysis of the common oculo-motor exists with integrity of the interior muscles of the eye.

The tract of the radicular fibers of the external oculo-motor nerves through the isthmus of the encephalon is very complicated, and each traverses parts lesion of which could not pass unnoted, because of the effect on the major organic functions. Now to admit an alteration proper to the radicular fibers, a fact rarely presented, we may say that only focal lesions can attack these radicular fibers. Consequently there will be the symptoms of a lesion which, conjointly with the variety of the paralysis, will permit diagnostication of the seat of a cerebral alteration. It is thus that a ptosis with crossed hemiplegia would indicate an intra-peduncular focal lesion at the spot where the fibers of the levator superioris palpebræ passes.

For the same reason we could say that paralysis of the oculo-motor with integrity of the iris and of the accommodation, and accompanied by crossed hemiplegia—paralysis of the facial and of the hypoglossal may exist or not,—permits us to diagnosticate intra-cranial fascicular paralysis.

But when all these symptoms exist with total paralysis of the external oculo-motor this diagnosis could not be made with the same certainty. It is even more probable that here the cause relates to a basal lesion.

In spite of the little knowledge that we have on paralysis of the pathetic, we know that in meningitis this nerve

may be attacked not only by an exudation at the base of the cranium, but also by an intra-cerebral exudation (Mauthner).

With regard to lesion of the external rectus during its intra-cerebral passage, we can admit this if it is combined with paralysis of the extremities of the opposite side. Isolated cases are very rare, but if such present we would be authorized to suppose the existence in the bridge of Varolius at the place where this nerve traverses it.

#### I. ORBITAL OPHTHALMOPLLEGIAS.

*Ætiology.*—Does there exist a primary alteration of the ocular muscles capable of producing their paralysis? Mauthner says that we know no such cases, but this is not a sufficient reason to deny its possibility. It is known that in consequence of refrigeration any muscle or groups of muscles may be suddenly attacked by paralysis. The oculo-motor muscles would not escape more than any others, and in medical literature I have found a great number of observations of this kind. However, I must avow that it has been impossible in any case to exactly determine the seat and the nature of the lesion. In some the affection appears to have attacked the muscle directly and primarily, while in others the paralysis appeared consecutive to an intra-cranial alteration of the nerve.

Electrical reaction, which permits us to distinguish nerve paralyses from paralyses of the muscular fibers when it relates to muscles accessible to touch or vision, is not applicable to the muscles of the eye. On the other hand, differential diagnosis would be possible only in the early stage, for later, when atrophy or degeneration of the muscular fibers follows, it is impossible to know if this alteration is primary or secondary.

Another cause of direct muscular alteration is traumatism, a ball, a wound by a cutting or blunt instrument, an operation, etc. One or several muscles may be injured, or simply obstructed in their action by a tumor of the orbit which imprisons or compresses them. Finally, some mus-

cles may be considerably atrophied, or even wholly absent. I have already published a case of this kind in the *Revue clinique d'oculistique* (1886, p. 256), and, later, two others in my *Mémoires et observations d'ophtalmologie pratique*, (1889, p. 101), but generally it is impossible to determine whether we have to deal with absence of the muscle, with atrophy, or with a paralysis. I do not dwell on this point except to add that, in a case of congenital muscular paralysis, Seiler has anatomically proven the absence of muscles from a completely developed eye. In this case there were wanting on the right the two obliques, and on the left the two obliques and the rectus superior.

It is not impossible, then, that in some cases of congenital external ophthalmoplegia, as, for example, in the cases lately reported by Lucanus (*Zehender's klin. Monatsbl.*, July, 1886, p. 271), the cause was due, not to a nuclear paralysis, but rather to an absence of the muscles. This question is especially important in simple or double paralysis of the external rectus. This paralysis, which is always total, presents the peculiarity that the secondary deviation inward is always very limited, or, a more extraordinary occurrence, may be entirely wanting. Mauthner has observed a case of this kind.

*Diagnosis and symptomatology.*—The diagnosis of orbital ophthalmoplegia is sometimes easy, sometimes difficult to determine. When we find a deviation of the ocular globe, when we feel a tumor with the finger, when we find the existence of a chemosis, of an abnormal dilatation of the veins of the peri-orbital region, etc., the paralysis is evidently only a symptom of the primary lesion of the orbit. The same is true in pulsating exophthalmus and in Basedow's disease.

To diagnosticate orbital paralysis it is essential to give attention to the exophthalmus, to the number of muscles affected, and to the state of unilaterality or bilaterality of the affection.

It must be understood, however, that exophthalmus does not always speak in favor of an orbital paralysis. In

fact, in total paralysis of the common oculo-motor, for example, the globe is more or less prominent, and this is especially marked if the affection is unilateral.

Paralytic exophthalmus is reduced easily and without pain; nevertheless the opposite is not always pathognomonic of an orbital paralysis. In a very sensitive person paralytic exophthalmos may be painful to pressure, while pressure may be completely painless in another less sensitive person afflicted by tumor or inflammation of the fundus of the orbit.

The second point to examine in orbital paralysis is the number of muscles attacked. If the paralysis does not attack all the branches of the common oculo-motor we can affirm that the lesion does not reside in the orbit, for it would be singular to see it attack in the nervous cord only the fibers going to such or such muscles. On the other hand, a paralysis which comprises only the small oblique and the internal muscles of the eye is very probably orbital. Save this special case no other paralysis is characteristic by itself of a lesion in the orbit, and it is by the complication that we would recognize its origin.

The third point to note is the unilateral or bilateral condition of the affection. Double ophthalmoplegia has rarely an orbital origin, because it is necessary to admit the same lesion in both orbits. However, this does not absolutely exclude such an origin.

It results from all these points that neither the absence of exophthalmia nor the localization of the paralysis to some of the muscles innervated by the same or by different nerves, not the bilaterality of the phenomena, but only a total isolated paralysis of the common oculo-motor with integrity of the superior oblique and of the external rectus, speaks, *a priori*, against an orbital lesion.

## II. BASAL OPHTHALMOPLEGIAS.

The oculo-motor nerves after their emergence from the brain pass to the base of the cranium before penetrating into the orbit by the sphenoidal fissure. The common

oculo-motor, which arises quite in front of the bridge of Varolius, has a much shorter track than the external oculo-motor, or the patheticus, which has a still longer one. Their relations with the neighboring or contiguous parts are necessarily different according to place at which we examine them, and it is sometimes the simultaneous occurrence of other cerebral or sensorial troubles which guides relatively as to the seat of the lesion. An important peculiarity to note, however, and one which we must often take into account in complicated paralyses, is that all the oculo-motor nerves emerge from the brain on the side corresponding to the eye to which they are supplied, but their intra-cerebral origin is from the same side only in case of the third and sixth pair, and yet we have seen that a small part of the fibers of the common oculo-motor decussate with those of the opposite side. The patheticus appears to undergo a complete decussation in the thickness of the valve of Vieussens, although this fact is not absolutely beyond doubt.

Another point worthy of remark is that at the base of the cranium proper the common oculo-motor nerves are extremely near their origin. The same is true of the external oculo-motors.

*Diagnosis.*—The diagnosis of the basal paralyses is in most cases extremely difficult and very often impossible. There exists in fact only one symptom which permits us to exclude basal paralysis; this is integrity of the interior muscles with paralysis of the external. All other signs are wanting in exactness. Total paralysis of one or several muscles may also be basal rather than cerebral. When it relates to a slightly marked paralysis and limited to some branches or some nerves, especially when this appears and disappears by turns, it is more often of cerebral origin, and then nuclear; it has likewise a very great importance, for it calls attention to tabes, disseminated sclerosis, and progressive paralysis, but we cannot, even in this case, exclude a basal origin with any certainty.

Basal paralysis and nuclear cerebral paralysis both de-

velop rapidly or slowly ; in both cases the cephalalgia and the other cerebral phenomena may be lacking or they may be present. Recurrent paralysis of the common oculo-motor—a special form of which Mauthner reports four cases—is according to this author of basal origin, not functional, but organic. In most cases there is a meningeal change. In the fourteen cases reported by Mauthner and taken from Gubler, Graefe, Saundby, Hasner, Möbius, Thomsen, Remak, Parinaud, Weiss, Suelz, and Manz, the affection was always limited to only one common oculo-motor, and always recurred on the same side. The nerve was affected in all its branches.

The double total paralysis that Graefe attributes to refrigeration may be of basal or of nuclear origin. Its course may be slow or rapid, and it is cured in a short time.

The double paralysis of the external rectus that we sometimes observe is very difficult to explain with regard to the seat of the trouble. Lilienfeld, in a case accompanied by disturbance of accommodation and optic neuritis in an alcoholic neuropath, has admitted the existence of a multiple neuritis. This was possible, but nuclear paralysis may also begin by paralysis of the external rectus. The same was also true in a case of diffuse superior polyencephalitis reported by Vernicke. But a basal cause would be equally possible, being given that the two external oculo-motor nerves emerge very near each other at the posterior edge of the bridge of Varolius.

Tumors of the median fossa extending into the cavernous sinus of both sides may compromise the two external oculo-motor nerves ; but in general, aside from multiple neuritis, there may be a nuclear affection, an affection of the nerve trunks at the base of the cranium at the point of their emergence, from symmetrical compression of the cavernous sinus by tumors, or from atrophy by compression consecutive to an exaggeration of the intra-cranial pressure at the same point.

Double paralysis of the common oculo-motor may be due

to a comparison of the two nerve trunks placed side by side after their emergence from the bridge of Varolius ; to compression of both nerves at the base of the cranium, produced by a retraction of the laminar tissue after a chronic partial basilar meningitis ; to an atrophy by compression due to a dilatation of the deep cerebral artery and of its branches (case of Turck and Nothnagel ; and finally, to an affection of the nuclei. The differential diagnosis is established in this case by the integrity of the intrinsic muscles.

I have already said that the diagnosis of the basal paralyse was often facilitated by the simultaneous existence of cerebral or sensorial troubles due to a lesion or to a functional disturbance of the parts contiguous to the oculomotor nerves. It is important, then, whenever difficulty presents in the diagnosis of an ophthalmoplegia, to examine with care the function of the olfactory nerve, of the optic, of the facial, and of the auditory.

Alteration of smell accompanying an ophthalmoplegia pleads in favor of a basal origin, but when the nuclear nature is proven by the integrity of the internal muscles the symptoms of anosmia indicate a lesion of the olfactory bulb, in a way a nuclear affection of this nerve, for there would be no reason to admit on one hand a primary affection of the nuclei, and on the other a basal cause.

There exists, however, a relation between nuclear and basal paralysis on which I must insist. In fact, it is possible, says Mauthner, that a tumor seated in one hemisphere may become the cause of a basal unilateral compression of the anterior nerves of the brain, while a hydrocephalic dilatation of the fourth ventricle would produce a compression on the nerve nuclei situated at the base of this cavity. It may occur, therefore, in consequence, that we find unilateral paralysis in the domain of the anterior nerves of the brain aside from phenomena of bulbar paralysis, for which, by not giving attention to the dilatation of the fourth ventricle, we could not find sufficient cause.

Mauthner reports a great number of these paralyse, which are interesting because of their rarity, and which

indicate to us how the state of the optic nerve and of the internal muscles of the eye sometimes permits us to differentiate basal from nuclear paralyses. However, this is not always easy. In fact, double amaurosis, without lesion visible to the ophthalmoscope or with papillary atrophy, has no value with regard to the localization of the lesion, for autopsy has shown several times that this may follow both in nuclear and in basal paralysis.

When the paralysis attacks a common oculo-motor of one side at the same time that the opposite side of the body is affected by hemiplegia, if the internal muscles of the eye are intact, it is almost certain that we have to do with a central fascicular paralysis, but the same diagnosis may be given sometimes even when the internal branches of the common oculo-motor are affected. If the hemiplegia is primary, and the third pair attacked only later on, it is probable that in this case it relates to basal ophthalmoplegia, though this is not an absolute rule. If, on the contrary, the hemiplegia succeeds the ophthalmoplegia we have a reason for admitting a primary nuclear paralysis.

But although the diagnosis of basal paralysis appears positively established, it does not follow that we know the exact seat of the affection which attacks the paralyzed basal nerve. In fact, this affection need not necessarily be at the base; for example, a tumor of the cerebral cortex or of another part of the brain may, by the often considerable secondary dilatation of the ventricle, produce such an increase in the intra-cranial pressure that the nerves of the base are visibly flattened.

*(To be continued.)*

## GUAIACUM IN DISEASES OF THE TONSILS AND PHARYNX.

BY HORACE F. IVINS, M. D., PHILADELPHIA.

Homeopathic literature contains so little reference to this remedy in such affections that I have thought it well to call attention to some of its valuable clinical points.

The following quotations are all that I have been able to find in our literature :

Hering's "Condensed Materia Medica" gives "violent burning in the throat; threatened tonsillitis"; his "Guiding Symptoms" adds "quinsy, diphtheria."

Allen's "Handbook of Materia Medica" gives but one word, "tonsillitis."

Lilienthal's "Homeopathic Therapeutics" (third edition) contains the following: "Threatened tonsillitis; violent burning in throat; formation of abscess; *pus has a horrid taste and seems to fasten on pharynx.*"

Apparently the only reference to a specific action on the pharynx is by Dr. William C. Goodno, *Hahnemannian Monthly*, February, 1891 (quoted in the writer's work on "Diseases of Nose and Throat"): "In the ordinary forms of pharyngitis, such as so frequently develop after cold, it is nearly a specific remedy, much superior to belladonna and other remedies which are generally prescribed."

The dominant school has used guaiacum in throat affections for a long time and from that source are taken the following :

Mackenzie, "Pharynx, Larynx, and Trachea" (1880) says: "In cases of deep tonsillitis the treatment required is

much more active [than in the superficial form], but fortunately there is a remedy which, if administered at the onset of the attack, will always cut short the crescent inflammation. This is guaiacum. . . It was formerly much given for this complaint in the form of the ammoniated tincture, but fifteen years ago Dr. Crompton of Manchester recommended me to try it as a powder. Taken in this way it seems to have a local as well as a constitutional effect. Soon after I prescribed it as a lozenge, and it is now largely used in that form. A lozenge containing 3 grains of the resin, given every two hours, will seldom fail to arrest the disease at its first onset."

Sajous, "Diseases of Nose and Throat" (1885), referring to acute pharyngitis, writes: "Guaiacum is also a valuable preparation internally as well as locally, especially when the affection occurs in a rheumatic individual. One dram in one-half glass of milk, used as a gargle and swallowed every three hours, generally succeeds in averting the attack after three or four doses. It may also be administered in conjunction with steam, a dram being placed in a teacupful of hot water. The cup being covered with a towel folded into a cone, the mouth is placed over the upper opening and the steam is inhaled as long as it is generated."

In reference to acute tonsillitis he adds: "We fortunately possess for this affection a remedy which has certainly not been overestimated, and which, in my hands, has not as yet failed to cut an attack short if administered early. In erythematous as well as parenchymatous and follicular tonsillitis guaiacum can be termed a specific. The method which I usually follow in administering it is to prescribe the ammoniated tincture, one teaspoonful in a half glass of milk, and to order the patient to first gargle with a mouthful of the solution, then to swallow it. Enough of the powder to cover a penny is then placed far back on the tongue, the sufferer being directed to keep it there as long as possible. When the affection has progressed for some time, *i. e.*, more than two or three days, guaiacum is no longer useful."

Lennox Browne, "Diseases of the Throat," in speaking of tonsillitis states: "Guaiacum lozenges are serviceable in the early stages in producing resolution, but are only wearisome and useless when symptoms of suppuration are manifest."

In referring to acute pharyngitis he wrote: "Guaiacum lozenges relieve capillary engorgement; and, probably, also, act constitutionally when the diathesis is arthritic."

McBride, "Diseases of the Throat, Nose, and Ear," when speaking of tonsillitis makes the following statement: "Even in the mildest cases it is well to begin *treatment* with guaiacum, provided the conclusion be come to that the case is one of simple tonsillitis only. This is administered every few hours, in the form of lozenges, in which the resin is combined with black currant jelly (London Throat Hospital Pharmacopœia). In certain cases this drug seems to have almost the effect of a specific."

Ingals, "Diseases of the Chest, Throat, and Nasal Cavities" (second edition), says: "Guaiacum has been highly recommended for aborting the disease [acute tonsillitis]. It is given in the form of troches, each containing 2 or 3 grains, every two hours during the beginning of an attack, or the ammoniated tincture in doses of a dram every fourth hour may be administered in milk. Although this remedy has the sanction of high authority, I must admit having seen very little, if any, benefit from its use. . . . Whenever there is evidence of a rheumatic habit guaiacum is indicated, and may be advantageously combined with small doses of opium and moderate doses of potassium bromide, which relieve the pain and lessen congestion."

About two years ago I began in earnest my experiments with guaiacum, using 1-drop doses of the 2x dil. Acting upon the advice of the dominant school, I tried it in the early period of acute tonsillitis only, not giving it after the stage of pus formation. The few cases in which I had an opportunity of trying it did so well where given early that no other remedy was necessary, no case suppurating, so that I have not had occasion to use it in tonsillar abscess,

where, judging by the quotation from Lilienthal, the remedy should be efficient. In follicular tonsillitis it seems to be less useful than in the other forms of tonsilar inflammation. In the former affection apis and ignatia have proved more satisfactory.

In hypertrophy of the tonsils guaiaacum appears to have little effect in directly reducing the enlargement, but by its action on future inflammatory seizures it indirectly and finally induces great changes. When the crypts of the tonsils are dilated and filled with cheesy masses guaiaacum acts almost as satisfactorily as merc. iod. rub. 3x.

Its promptest action seems to be on the pharynx, especially in the very beginning of acute or subacute pharyngeal catarrh, particularly if the result of slight exposure to draughts or by being uncovered in bed at night, and for those without explainable cause where the throat feels rough, with decided burning and slight pain on swallowing, the pain often shooting to the ears, but without much fever. The throat appears dull red and soggy, with some enlarged vessels. In such cases I prescribe the guaiaacum in drop doses every half hour to one hour; as a rule four or five doses are sufficient to bring about the desired result. The post-nasal region participates very decidedly in the inflammatory process, so that a tenacious mucus is drawn from the posterior nares. The expectoration is usually scanty, often stringy, but not lumpy.

In a number of patients suffering from chronic pharyngeal catarrh, and who have frequent acute exacerbations, I give guaiaacum as a prophylactic, with the happiest effects.

As yet I have been unable to obtain any satisfactory results from this remedy in catarrh confined to the nasal fossæ, but the larynx is not infrequently relieved when secondarily invaded, there being a tickling cough and slight hoarseness.

It is earnestly hoped that this preliminary report will serve to induce others to publish their experiences with the use of guaiaacum in diseases of the throat.

## AN OUTLINE OF THE WORK DONE IN THE NEW YORK OPHTHALMIC HOSPITAL.

BY CHARLES DEADY, M. D.

At the request of some of our readers who are away from the large cities, and are therefore debarred from obtaining experience in the large clinics which exist in the great centers of population, I propose in this paper to give some idea of the methods used in the New York Ophthalmic Hospital, the largest institution of its kind in our own school of medicine, and with two or three exceptions the largest in any school the world over.

I shall outline the treatment of cases mainly as performed in my own clinic, which is a type of all, only those differences being found which are peculiar to the personalities of the different surgeons as suggested by their experience, the routine being much the same in all cases.

Between fourteen and fifteen thousand new patients are treated each year in the institution, the outdoor department of which is divided into eleven clinics. The staff consists of twelve surgeons, each having his own clinic except Dr. Houghton, who has resigned his desk after twenty-five years' continuous service, but who still visits the hospital frequently and is always at the call of any of the staff needing his advice.

Two large clinics are devoted to the treatment of diseases of the throat, and nine others treat eye and ear cases only.

Nineteen assistant surgeons and four or five clinical assistants are distributed throughout the various depart-

ments, beside the house surgeon and assistant house surgeon of the hospital proper.

In the present paper only eye and ear work will be considered.

The greatest care is used in examinations for anomalies of refraction and accommodation. Every case presenting for eye affections, unless the disease is manifestly an external one requiring immediate attention, is carefully tested for the state of refraction. The vision is first taken by the card, then the patient goes to the dark room, where retinoscopy and the direct method are employed and the approximate refraction ascertained. If myopia or astigmatism is present a mydriatic is used if possible, and the total refraction taken. We use hyosciamine hydrobromide commonly, in a one per cent. solution, having the patient wait forty-five minutes before examination, in which time the accommodation is thoroughly nil in most cases. Where myopia is present with persistent spasm we give the patient a solution of atropine (Merck's), four grains to the ounce, to be instilled every night, and continue its use until all spasm has disappeared and the true myopia is manifest. Homatropine we do not use, believing that its action is not sufficiently profound for refractive work; cocaine is used always when only dilatation of the pupil is required for intra-ocular examinations. After the accommodation has resumed its sway the necessary glass is prescribed.

In the purulent conjunctivitis of the newborn the patient is kept in bed, the eyes are cleansed every ten to fifteen minutes in the twenty-four hours, iced cloths are constantly applied (unless there is a tendency to breaking down of the cornea, when they are dangerous), a weak solution of argent. nit. (never more than one grain to the ounce) or of bichloride of mercury 1-2000 is dropped into the eyes every two or three hours after cleansing, and the appropriate remedy is given internally. Arg. nit. and pulsatilla are the remedies most frequently indicated.

In gonorrheal conjunctivitis of adults the treatment is the same respecting cleanliness and cold applications, but

here most of the surgeons use a local application of nitrate of silver in a thirty-grain solution applied to the palpebral conjunctiva once or twice daily, and carefully neutralized with a salt solution. This treatment was introduced in the hospital by the writer in 1882, and we rarely see perforation of the cornea in cases so handled. Where the haziness appears which indicates approaching necrosis of the cornea we give calc. hypophos. 1 every hour or two; this remedy will usually do more to prevent ulceration in this disease than any other treatment. Of course the exact homeopathic remedy is given when it can be found, but many of these cases are very difficult to prescribe for on account of the paucity of subjective symptoms.

In croupous conjunctivitis the principal remedies are acetic acid and kali bich. in the dangerous stage when the membrane is forming. Acetic acid was first used in this disease by the writer in 1879. Being then also in general practice, I had succeeded in curing a severe case of membranous croup with this remedy when a case of membranous conjunctivitis presented in the clinic which defied all the usual remedies then in vogue. I was struck with the similarity of the membrane in the eye to that I had just cured in the throat, and therefore prescribed the same remedy, with an immediate happy result. I use the dilute acid of the pharmacopœia, a few drops in water, with a little sugar if necessary, making an agreeable lemonade. It is indicated where the membrane is tough and adherent, kali bich. having a loose flaky membrane.

It is a curious fact that we have in the hospital very much less conjunctivitis trachomatosa than formerly. When distinctive symptoms present I much prefer to treat this disease with the homeopathic remedy alone, but in many cases these cannot be obtained. In acute cases where the eyes feel hot and dry aconite and the ice bag do well. Rhus is also a prominent remedy, the acute disease being accompanied with profuse scalding lachrymation. The symptoms of these and other remedies are well known and are all to be found in Norton's

handbook, but in many cases the paucity of symptoms renders it impossible to select a remedy with accuracy. For a year or two we have been experimenting in some of these cases by rubbing in a solution of bichloride of mercury 1-1000 after cocainizing the palpebral conjunctiva, and we have had some good results. How much of this improvement has been due to the massage it is impossible to say, but I think the drug has an effect of its own, as I have tried it by dropping in the 1-1000 solution and giving the remedy internally and have had some excellent effects. In the form of this disease where the granules are large and succulent I think expression with the roller forceps or otherwise is the quickest treatment, but care must be used or the reaction may be too great.

In conjunctivitis and keratitis phlyctenularis the patient is commonly scrofulous, and we prescribe carefully for the entire systemic condition; atropine is used if there is any pericorneal injection, and by its use we frequently lessen pain and photophobia; where the latter is excessive I have found that it is much modified, and often permanently so, by holding the eyes open and slowly dropping ice water upon the cornea. These patients are forbidden to use tea and coffee, are put on a plain nourishing diet, and are kept in the open air as much as possible. One of these cases with the worst and most persistent photophobia I ever saw was cured in a few days by silicea after lasting for weeks under the most careful prescribing. These attacks commonly recur again and again in the class of children we have to treat, and are only cured by a thorough course of constitutional treatment.

Where deep ulcers of the cornea form, with a tendency to perforation, we use a pressure bandage and either atropine or eserine solution (the latter 1-200) locally, according to the situation of the ulcer; when the latter is near the center of the cornea the dilatation of the pupil by atropine prevents entanglement of the iris in case of perforation; when near the periphery eserine by contracting the pupil renders the same service.

In the large flat opaque ulcer, which appears raised above the surface and has a leash of vessels running to it, we have found the best treatment to be the pressure bandage with atropine locally and merc. prot. internally, unless some other remedy were specifically indicated.

In the indolent ulcer often found in adults who are run down, where the conjunctiva is a dull red and the whole eye has a sluggish appearance with the tendency to the formation of pus and a liability to hypopyon, I have frequently seen the best results from ars. iod. 3x to 6x. These cases are sometimes helped by feeding the cornea with beef juice or bovine dropped upon it, as recommended by Dr. L. B. Couch in an article in the JOURNAL some time since. The patient is also well fed upon concentrated nourishment and kept quiet; atropine and a pressure bandage are used. If hypopyon supervenes, hepar, silic., rhus, or calc. hypophos. may have to be used, according to the symptoms; when remedies fail to act, as they may, as these patients often have very little stamina, a flaxseed poultice will often clear up the hypopyon overnight, provided it has not existed long enough for the pus to become organized; when this fails I have seen the eye clear up in a very short time from the careful and sparing application of the electro-cautery at a red heat.

In iritis we break up all adhesions as soon as possible, using first the four-grain solution of atropine; if this fails after several instillations hyosciamine hydrobromide one per cent. solution is used, and if necessary crude atropine may be employed by placing small crystals inside the lower lid. Of course the patient is carefully watched and the drug used less often if poisonous symptoms appear, but the first desideratum is to dilate the pupil; usually the eye is kept warm by a pad of cotton, covering the eye and head of the affected side; in some cases, however, we find that the ice bag gives great assistance. The choice can be made by the preference of the patient; what feels most comfortable will usually do the best work. Dr. Helfrich was the first to use ice in this disease and it has proved very use-

ful in some cases; the cornea must be carefully watched for signs of ulceration, which would at once contra-indicate the use of ice. The remedies most commonly used in iritis are for the syphilitic form aurum, with the general symptoms and especially the mental depression, cinnabar with the circumorbital pain, kali iod., and especially merc. corr.; the latter is the most useful remedy with intractable cases with high degree of inflammation and the mercury aggravations. Thuja and cinnabar are especially indicated when gummata are present. Bryonia, cedron, rhus, and spigelia are the principal remedies used in the rheumatic form, and hepar and rhus especially for the suppurative form, the latter particularly for that caused by traumatism. Kali hyd. will cure more cases of plastic choroiditis than any other one remedy, and is especially indicated where opacities of the vitreous exist; this remedy will do good service also in that form of choroidal affection which appears with myopia and staphyloma posterior. In this latter condition I have made many experiments with the subconjunctival injection method of Darier as published in the JOURNAL, vol. v. part I. I use a solution of 1-1000 made from the commercial tablet, one tablet to a pint of water; this I filter carefully two or three times through fine filter paper, until it is perfectly clear. The hypodermic is used for this purpose only and has a fine needle. Inserting the needle beneath the conjunctiva, one drop is injected; the needle may be entered anywhere in the ocular conjunctiva, care being taken to avoid the vessels to prevent ecchymosis; the membrane is rendered anæsthetic with cocaine. Reaction is very slight, and the dose may be repeated in from three to five days. I have used this in several varieties of disease of the fundus, but I think its particular sphere is in the amblyopia which accompanies myopia with posterior staphyloma; the results in some cases of this character have been remarkable.

In many of the cases of retinitis the disease is due to organic affections elsewhere in the system and the treatment must be largely based on these conditions. In

idiopathic retinitis, however, we have a most excellent remedy in duboisia. I made the only proving of this remedy, and one of the most important conditions developed was a congestion of the retina almost to the point of inflammation. So severe was it that I was obliged to suspend the proving for fear of hemorrhage in the retina, as in both provers the retinal veins were engorged to the last degree. The remedy has proved very serviceable in many cases of idiopathic hyperæmia and inflammation of the retina, and is especially indicated where there is a pain over the eyeball, between it and the edge of the orbit. It is also useful in chronic hyperæmia of the conjunctiva and in pharyngitis sicca. Belladonna is another remedy we find very useful in idiopathic retinitis when we are able to get the head pains of the remedy.

I have seen severe cases of neuro-retinitis and neuritis proper rapidly clear up under the remedy indicated by the headache, even when the latter was so severe and prolonged that brain tumor had been diagnosed by competent observers. A remedy which is too often neglected in neuritis is pulsatilla; when any symptoms can be found to justify its use this is one of our very best remedies for this condition. Dr. Rounds has done some great work in atrophy of the optic nerve with 5-drop doses of the tincture of agaricus. We hope to have an article from him on this subject in the near future.

The treatment of cataract varies in the different clinics. About half of our surgeons make the simple operation; the others use the upward medium flap, with preliminary iridectomy. We have long since discarded the dark room after the operation, some of our operators using a roller bandage, and others merely closing the lids with plaster; patients are only kept in bed two or three days, as a rule, unless complications ensue. In cases where, from difficulty in extracting the lens or otherwise, the eye has undergone much manipulation and we fear bad results from bruising the edges of the wound, or in irritable eyes, we have found

excellent results from the use of the ice bag, which is laid alongside the head next the operated eye. It prevents reaction and has saved many an eye since I first used it in 1882. In the first stages of inflammatory complication when the lids become a little puffy we find rhus tox. the best remedy.

In stricture of the lachrymal duct I have long since given up the gradual dilatation by probes, and very rarely perform Stilling's cutting operation or Bowman's operation on the canaliculus. I pass a small probe, dilating the punctum if necessary with a pair of spring forceps of small size (using cast-off iridectomy forceps commonly), and when the probe meets the obstruction I attach the negative pole of the galvanic battery, and placing the positive pole on the face or neck, turn on four or five cells; the obstruction, as a rule, readily gives way, and by increasing the size of the probe at each sitting until No. 5 is reached a free passage is soon obtained. Injections of oil or some weak astringent are often used to clear up the catarrhal condition. The commonest remedies are stannum when the discharge is mucous, puls. when muco-purulent, and silic. or hepar when purulent.

The great bulk of our ear cases are either chronic catarrh or chronic suppuration of the middle ear, and these have been so often written up by Drs. Houghton and Rounds that I shall mention only two items in this connection. The first is the packing of the suppurative ear with the 2x or 3x trituration of merc. corr. as recommended by Dr. MacBride. I have used this very frequently with excellent results; it is one of the best methods of treatment for very old cases of suppuration which the usual methods have very little effect on. The other recommendation is that of the use of kali phos. in cases of suppuration where the discharge is offensive. I have used this remedy in a large number of cases where the discharge was of various colors and degrees of consistency, the common symptom being the offensive odor; the results have been so favorable that

I think I am justified in placing this remedy at the head of the list of drugs which are useful in this condition.

The foregoing is not intended to indicate that routine treatment is practiced in the hospital ; such is very far from being the case ; the strict homeopathic prescription is made in every case where it is possible, but in every large institution where thousands of cases are treated yearly certain remedies and methods will come to the top as the most useful in a majority of cases, and these I have tried to indicate in the barest outline.

## BOOK REVIEWS.

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AN OUTLINE OF THE EMBRYOLOGY OF THE EYE. With illustrations from original pen drawings by the author. By WARD A. HOLDEN, A. M., M. D., Assistant Surgeon New York Ophthalmic and Aural Institute; Clinical Assistant Vanderbilt Clinic. The Cartwright Prize Essay for 1893. New York: G. P. Putnam's Sons, 1893.

In this little monograph of sixty-nine pages, with nine woodcuts and ten plates, the author has given us a concise and remarkably clear description of the development of the visual organs, which is particularly valuable from the fact that it is the result of his own work and not a rehash from the various authorities on the subject. The conclusions presented are the result of much patient study, the embryo chick and the foetal rabbit and pig having been examined in all stages of development. There are two parts to the work, the first being an outline sketch of the processes occurring, and the second being devoted to the histology. The work has evidently been performed in a careful and scientific manner, and the results are presented in a readable and interesting form. The text embodies simply the personal opinions of the author as derived from his experimental research, except where his conclusions differ from those arrived at by other workers in the same field, in which case the various theories are stated and their origin given.

The volume should be carefully read by all interested in ophthalmology. The press work and binding are worthy of the house of Putman.

A TEXT-BOOK OF OPHTHALMOLOGY. By WILLIAM F. NORRIS, M. D., Professor of Ophthalmology in the University of Pennsylvania, and CHARLES A. OLIVER, M. D., Surgeon to Wills Eye Hospital, Philadelphia. In one very handsome octavo volume of 641 pages, with 357 engravings and 5 colored plates. Cloth, \$5.00; leather, \$6.00. Philadelphia: Lea Brothers & Co., 1893.

This work is a credit to all concerned in its production—to the authors in the fact that they have given us a fresh, readable,

and in many parts almost fascinating presentation of the subjects treated of; that while writing on themes which in most part must of necessity have been discussed at all points by previous publications, they have yet succeeded by a charm of literary style, and particularly by a felicity of illustration, in investing these dry details with a new interest for the reader.

The name of the publishing house is a guarantee that the press work is well done, but particular attention is due to the excellence of the engravings and plates which are thickly interspersed throughout the pages of the volume; many of these are new; all of them are artistic and beautifully printed.

Some fifty-three pages are devoted to the macroscopic and microscopic anatomy of the eye, which is fully treated in all its parts from the bony walls of the orbit to the final radiations of the fibers of Gratiolet in the cortex of the occipital lobe of the brain, and is the best exposition of this subject which we have seen in a work of this kind. Chapter iii. treats of the physiology of the eye in an interesting manner, and is followed by a most excellent presentation of the principles of physical and physiological optics which is rendered very interesting by the introduction of new methods of illustration which tend to simplify the subject for the novice, and which is one of the best things in the book.

In the chapter on examination of the eye all the newer methods are explained in a careful and interesting manner, and the same may be said of the treatment of errors of refraction and accommodation and the methods of their correction. For some reason unknown to the writer the determination and correction of errors of refraction and accommodation are treated in chapters ix. and x., while the consideration of emmetropia, hyperopia, myopia, and astigmatism *per se* is taken up in chapter xviii., after the diseases of the iris and ciliary body. It would seem as if the "eternal fitness of things" would have been better subserved by having this matter continuous.

In speaking of cataract operations the author gives it as his opinion that the flap operation combined with iridectomy will give an average of better results than the simple operation.

The chapter on the retina is very interesting, and is better arranged than is the case in some other works.

Many of the operations are separately described in the final chapter. As a whole, the work is excellent, the style terse and

vigorous, and the matter up to date. It should be read by all interested in the subject.

A HANDBOOK OF OPHTHALMIC SCIENCE AND PRACTICE. By HENRY E. JULER, F. R. C. S., Ophthalmic Surgeon to St. Mary's Hospital, Surgeon to the Royal Westminster Ophthalmic Hospital, London. New (second) edition, revised and enlarged. In one handsome octavo volume of 562 pages, with 201 engravings, 17 colored plates, test-types, and color-blindness test. Cloth, \$5.50; leather, \$6.50.

This work has been enlarged by the addition of 100 pages and 75 engravings, the changes being mainly those necessary to bring it up to the present standard of ophthalmic science.

The volume has been enriched by the addition of a number of photo-micrographs, illustrative of various pathological conditions, which are well executed and add much to the interest of the text. We regret to say that we cannot say as much for the colored plates of diseases of the fundus, which are hardly up to the standard usually attained by the publishers. One merit of the work is the chapter on the color sense, which for a work of this character is exhaustive and excellent. The aim of the work is to treat the subject with brevity and conciseness, and only such matter as is of practical utility is admitted. The volume is intended for the student and general practitioner.

A DICTIONARY OF MEDICAL SCIENCE. Containing a full explanation of the various subjects and terms of Anatomy, Physiology, Medical Chemistry, Pharmacy, Pharmacology, Therapeutics, Medicine, Hygiene, Dietetics, Pathology, Surgery, Bacteriology, Ophthalmology, Otology, Laryngology, Dermatology, Gynecology, Obstetrics, Pediatrics, Medical Jurisprudence, and Dentistry, etc., etc. By ROBLEY DUNGLISON, M. D., LL. D., late Professor of Institutes of Medicine in the Jefferson Medical College of Philadelphia. Edited by RICHARD J. DUNGLISON, A. M., M. D. New (21st) edition, thoroughly revised, greatly enlarged and improved, with the Pronunciation, Accentuation, and Derivation of the Terms. In one magnificent imperial octavo volume of 1181 pages. Cloth, \$7.00; leather, \$8.00. Philadelphia: Lea Brothers & Co., 1893.

A new edition of this standard work will be welcomed by the profession, more especially as it comes to us with changes which will render it more valuable than ever. Forty-four thousand new words and phrases have been added, and in some cases it has been made almost cyclopedic, notably under the word "larynx,"

where we find a valuable table of differential diagnosis of all the diseases of the larynx, giving the functional, objective, physical, subjective, and constitutional symptoms and signs in parallel columns, the whole occupying about four pages. The page has been enlarged, derivation has been thoroughly given, and for the first time pronunciation has been introduced, indicated by simple and clear phonetic spelling. Everything obsolete has been excised, yet the work contains about one hundred pages more than the last edition. The volume is handsomely gotten up and will form a small medical library alone.

ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES—A Yearly Report of the Progress of the General Sanitary Sciences throughout the World. Edited by CHARLES E. SAJOUS, M. D., and seventy associate editors, assisted by over two hundred corresponding editors, collaborators, and correspondents. Five volumes, illustrated with chromo-lithographs, engravings, and maps. F. A. Davis Co., Philadelphia, New York, Chicago, and London, 1893.

In the 154 pages devoted to ophthalmology will be found many items of absorbing interest to those working in this branch of medical science. Under the department devoted to histological anatomy we notice studies of the minute anatomy of the retina by Cajal of Barcelona and Dodiell of Tomsk. The first gives a cut showing the arrangement of the nervous elements and the methods by which their continuity is preserved through the various layers of the membrane, which is more minute in detail than those commonly met with, and is very interesting. Dodiell presents two plates depicting the arrangement of the nerve fiber layer, and disproving the old idea that this layer is wanting in the macula, as fibers are shown not only here, but even in the bottom of the fovea single fibrillæ are found. Widmark of Stockholm has investigated the action of the ultra-violet rays of light upon the eye, with the conclusion that they "directly irritate the anterior media, causing injection, chemosis, and catarrh of the conjunctiva, keratitis, contraction of the pupil, and alterations in the iris." Also that "the lens possesses great absorptive powers for these rays, and becomes clouded after exposure to them." He thinks that "if this absorption did not occur the rays would probably cause serious lesions of the retina." Taking these statements in conjunction with the fact that the arc light is proved to

abound in violet and ultra-violet rays we can understand one of the causes of some of the affections found in those exposed to its influence.

As a result of the examination of sixty cases of long-standing headache Walton and Carter of Boston conclude that "(1) A large proportion of cases of functional cephalalgia, and especially migraine, is due wholly or in part to eye strain; (2) good vision is not inconsistent with such a difficulty; (3) when practicable, very slight errors of refraction should be corrected in cases of cephalalgia, as well as in others with functional nervous symptoms," which latter recommendation was made by our own Dr. Geo. S. Norton many years ago.

Ramsay of New York states that "errors of refraction should be studied under atropine, and muscular anomalies cannot be determined without a phorometer [?] (or rod test), and the judicious use of prisms. The eyes while being tested should always be properly corrected by means of glasses," a matter too much neglected by many oculists, "and if Javal's ophthalmometer be used it should be employed only in conjunction with a pupil that has been dilated with atropine." He has never seen a case of typical sick headache dissociated from eye strain, and draws attention to the fact that the accurate fitting of frames to the face of the patient is a factor too often overlooked in attempts to relieve eye strain.

Woodward of Burlington, Vt., states that "in his hands the variation incident to the ophthalmometer in the diagnosis of astigmatism is not a constant quantity," and gives the following reasons: 1. The anterior surface of the cornea is not spherical, it is ellipsoidal; hence the measurement of its curvature by the Javal-Schiötz instrument is only approximately correct. 2. The ophthalmometer does not deal with that portion of the cornea through which the visual line passes, but with an annular segment about one millimeter distant from the visual line. 3. The ophthalmometer does not inform us respecting the posterior surface of the cornea; if this be not parallel to the anterior surface that condition will influence the refraction of light. 4. The ophthalmometer does not measure lenticular astigmatism."

The experience of several of the prominent operators of the world is given relative to the merits of the simple operation for cataract as compared with that combined with iridectomy; the

majority are in favor of simple extraction, a prominent exception being Landolt of Paris, who strongly prefers the old method.

The notes of a case of myopia, where the vision was improved by the removal of a cartilaginous spur in the left nasal septum and the application of a pressure bandage to the eyes at night is reported by Bates of New York, who says that, "as a general rule, it may be stated that whenever cocaine, applied to the mucous membrane of the nose, produces temporary improvement of vision, the removal of any abnormality, however slight, at that point will produce permanent improvement in vision."

In the department of otology F. L. Jack of Boston reports sixteen cases of excision of the stapes for middle ear inflammation with excellent results.

Other operators advocate the removal of the drumhead and ossicles for the relief of deafness and tinnitus and also for attic suppuration; the consensus of opinion seems to be that the operation is not at all dangerous when properly performed, D'Oench of New York stating that in no case has he ever seen a bad result follow any of these operations. One hundred and eighteen pages are devoted to a review of the advances made in diseases of the nose and throat, which want of space forbids us to analyze.

# THE JOURNAL OF OPHTHALMOLOGY, OTOLOGY AND LARYNGOLOGY.

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## ACUTE SUPPURATIVE INFLAMMATION OF THE DRUM.

BY WILLIAM E. ROUNDS, M. D., NEW YORK.

This is the one disease which comes to the aurist, to save him from a life of monotony, and to try his skill to the utmost. It not only causes pain, many times almost beyond the endurance of the strongest patient, but it threatens the integrity of the organ of hearing and often even life itself. The importance of controlling this disease promptly at the commencement of an attack is appreciated by very few. Many physicians do not understand the difference between an acute catarrh of the drum cavity and the more destructive inflammation which, uncontrolled, sweeps on until it has within its grasp the greater part of the temporal bone.

The symptoms, at the very commencement of the attack, present a picture radically different from that of acute catarrh. The suppurative disease is usually ushered in by a more or less severe chill, followed by a marked rise in temperature, accompanied by most excruciating sharp tearing and shooting pain in the ear and through the affected side of the head. It often extends to the whole head, and even to the neck and shoulder. The pain is increased by pressure, especially on the mastoid process, when the disease has invaded this region. I have seen it in one night

cause a patient to look as though he had passed through a long sickness. Owing to the nearness of the brain many symptoms of cerebral irritation are liable to manifest themselves. The patient may become drowsy at intervals, which condition at times goes on to complete coma. Then we may have symptoms of nervous excitement, such as various muscular spasms, even to the production of epileptiform convulsions. It is not uncommon to see children suffering from this disease go into convulsions. Other subjective symptoms are loss of hearing, noises in the ear, oversensitiveness of hearing and double hearing, which are not very different from the same symptoms found in acute catarrh of the drum. In acute catarrh, however, the symptoms are not so severe, there usually being no chill or fever; and, while the pains are very often severe, they are not so intense. The two diseases, being an acute inflammation of the same cavity, are nevertheless distinct and widely different affections. The tendency of acute catarrh is to sclerosis of the tissue of the middle ear; and, except under very unusual conditions, never causes rupture of the drumhead. Acute catarrh of the drum never becomes acute suppuration, under proper treatment, except it occurs in a patient suffering from some constitutional weakness such as phthisis. On the other hand, acute suppurative inflammation of the drum is never modified into a catarrhal condition, but is in a sense a specific disease which must run its course. All treatment must be directed toward modifying it, and so controlling and guiding it as to prevent it from seizing upon the deeper structures of the temporal bone, where treatment of it is so difficult and often in vain. The objective symptoms are recognized chiefly, especially in the first stage, by inspection of the external auditory canal through the aural speculum, when the membrana tympani will be seen congested, swollen, and bulging slightly outward, the congestion extending to the osseous portion of the external auditory canal. The drumhead usually has from the beginning an appearance of being swollen and infiltrated, as though it were softening preparatory to breaking down;

a marked contrast to the drumhead during the course of an acute catarrh, when the membrane has a tough, sclerosed appearance, often bulging inward and never showing any inclination to break down.

In acute suppuration the inflammation of the mucous membrane of the drum cavity extends to the lining of the drumhead, producing ulceration of the mucous membrane and sometimes abscesses in the structure of the membrana tympani. Perforation occurs either from ulceration or through pressure of inflammatory products in the cavity of the drum, or in the majority of cases from a combination of the two causes. In scarlet fever the specific inflammation of a diphtheritic character produces rapid disintegration of the membrana tympani when the disease invades the middle ear and generally totally destroys the membrane. Ordinarily the drumhead has most remarkable powers of self-restoration, so much so that it is difficult to prevent the closure of a perforation, even when it is desirable to do so. But when—during an attack of scarlet fever, diphtheria, or even measles—the inflammation of the throat invades the central cavity of hearing, it rapidly destroys the drumhead, and, unless prompt measures are taken, robs it of all power of recuperation. In these cases the force of the inflammation carries with it not only the membrana tympani but the ossicula auditus as well, and at the same time invades the deeper structures of the ear. I saw a distressing case of this kind, in consultation with a physician of this city, some months ago. The case was one of malignant scarlet fever, in which the disease seemed to expend its force upon the ears, destroying the membrana tympani and sweeping away all the small bones except the stapes, both of which remained *in situ*. The patient suffered greatly from vertigo, and had for some days absolute loss of hearing. Under special treatment directed to the ears, carried on in conjunction with the regular treatment of the primary disease, she recovered a very slight amount of hearing, but all that could have been expected considering the severe inflammation of the labyrinth which she had under-

gone. While she was still convalescent the discharge was completely controlled and the drum cavity in a healthy condition. I have recited this case to emphasize my statement that all middle-ear complications of scarlet fever and diphtheria, should have special treatment during the progress of the disease, where it is practicable. This young girl I believe would have died if treatment of the ear had been delayed. If obstruction to free discharges of pus from the external auditory canal had been allowed to form, cerebral complications would have ensued. Of this there was every indication. The disease, under unfavorable circumstances, is liable to invade the brain through the numerous natural paths from the drum cavity, or the infectious material may be carried by the blood vessels. In fact metastatic abscesses may be developed in this way in any part of the body, producing, with symptoms of pyæmia, inflammation of the lungs, pleura, peritoneum, glands, etc.

The question of *prognosis* has reference first to the danger to life, then to the loss of hearing, and lastly the stopping of the discharge, which, if allowed to become chronic, may make life a burden. So far as the first consideration is concerned, certainly its gravity should not be underrated. Although the percentage of fatal terminations is not great, yet under the most prompt and faithful treatment it will at times be found impossible to prevent the affection extending inward. Caries and necrosis of some part of the temporal bone, most frequently the mastoid portion, are usually the causes of the fatal termination. The age of the patient will have a bearing on the prognosis. In infancy and old age the prognosis is more favorable than at other periods of life. The loss of hearing will depend upon the amount of destruction of tissue in the middle ear and the extent to which the labyrinth has escaped the morbid process. The loss of the drumhead does not of itself cause great loss of hearing. As a rule, if the ossicula auditus remain intact, the hearing will be fairly good. I have seen many cases with fair hearing in which the incus, stapes, and membrana tympani had

been destroyed. The discharge can usually be easily controlled when caries and necrosis do not exist.

*Treatment.*—The object of treatment should be to prevent the extension of the disease and limit the destruction of tissue as much as possible. It is therefore important that treatment be begun at once, for the life of the patient depends upon the checking of the extension of the disease, and the restoration of hearing upon the prevention of the destruction of tissue. At the commencement the patient should be put to bed in charge of a good nurse. It seems to me no one who recognizes the gravity of the disease would attempt to treat it unless the patient consents to remain in bed. I usually have the bowels relieved either by an enema or a saline cathartic, and prescribe the remedy indicated; selecting it by the character of the pains and the indications given by inspection of the meatus auditorius externus and throat. Aconite at the very beginning with the effect of the chill yet remaining and its peculiar mental distress and fear of death, high fever, burning skin and great restlessness. When the pain is marked by a throbbing character with deep redness of the throat, the membrana tympani beginning to look swollen and red, flushed face and tendency to delirium, belladonna will be indicated. If the patient is inclined to perspire freely—a cold, clammy perspiration which does not relieve the symptoms—if the symptoms, especially the pain, get worse at night with sore throat, mercurius will be called for. When the glands of the throat and vicinity are inflamed, swollen and tender, with other mercurius symptoms, I use the protoiodide of mercury. Another symptom of mercury is a desire of the patient to get out of bed as soon as the exacerbation of pain comes on. When suppuration has become established mercurius is indicated by a dull pulsating pain in the ear, and the pus can be seen pulsating through the perforation in the drumhead. The presence of sluggish pulsating pus in the drum cavity, showing through a small opening in the drumhead, especially if it be in the membrana flaccida, is a well verified indication for mercurius.

I do not remember mercurius proving of benefit when there has been a free, profuse discharge from the ear. It is indicated when the discharge is sluggish and there is a tendency to infiltration of the tissues of the membrana tympani and osseous external auditory canal. I have often seen mercurius helped out, so far as the relief of the night pains was concerned, by a few one-quarter-grain doses of quinia mur., repeated every hour, being careful not to give more than two grains in one day. This remedy increases the congestion if too large doses are given. When the pains are of a tearing, rending character—shooting all about the affected side of the head—with excessive tenderness of the mastoid process developing early, capsicum will be called for. If the mastoid process becomes swollen and red—a bright polished redness—capsicum is still more decidedly indicated. My experience leads me to believe that capsicum is only indicated in periostitis. When the deeper structures of the bone become involved and suppuration thoroughly established, with infiltration of the tissues, the usefulness of this remedy is gone. It can only be called for during the same attack by a fresh attack of periostitis.

Gelsemium is a remedy which has disappointed me many times. The symptoms calling for its use are dull throbbing pain in the ear, with slow, full pulse and occipital headache. Since the advent of grippe I have had a number of cases of acute middle-ear suppuration which found their remedy in gelsemium. This remedy can only be useful in modifying the attack. I have never seen it influence the course of the disease after suppuration has become established.

Hepar sulph. calc. This remedy, when indicated, if given at the commencement, will modify the attack very materially, and save the drumhead by assisting the escape of pus accumulating in the drum through the eustachian tube. For some years I have been in the habit of using ferrum phosphoricum in alternation with hepar in these cases. I am certain that in many cases hepar is materially strengthened in its unequal fight, when accompanied by this prepara-

tion of iron ; especially is this the case where there is great debility and prostration. The leading symptom of hepar is the extreme sensitiveness to contact. The patient dreads the very idea of an examination, and shrinks from the surgeon's hand before he is touched. He is also very sensitive to air, and is relieved by wrapping up the head and by warm applications. Unlike mercurius the patient is relieved by getting the head into a perspiration.

Sometimes much assistance is given the remedies by the judicious use of heat and cold. As a rule dry heat produces the best result exhibited in the form of heated salt or hop bags. The ordinary rubber water bag filled with hot water acts nicely. Sometimes the application of heat produces great aggravation of the pain, probably by interfering with the flow of blood from the head. In these cases the ice bag is worth trying. Although as a rule cold is not tolerated, cases are on record of the pain being relieved by the application of ice to the occiput and forehead, and at the same time heat to the ear. Sometimes the only relief obtainable is procured by poulticing the drumhead. The best method for this is a large fountain syringe so arranged as to keep a fine stream of water running against the ear drum continuously for some time. So far as possible foreign substances should be kept out of the external auditory canal. The meatus auditorius externus is nearly as intolerant of the presence of a foreign body as the conjunctiva, and many of the substances poured down upon the membrana tympani, even if they give a temporary relief, cause almost endless future trouble by producing so much inflammation of the external auditory canal that, when the drumhead finally breaks down, the free flow of pus is retarded, and the canal is so swollen that we cannot get at the deeper structures to treat them. No one can appreciate how important it is to have the canal clear unless he has treated a case in which it was swollen and tender.

Probably the most harmless preparation, so far as the canal is concerned, is a warm solution of cocaine and mor-

phine. But when the inflammation is expending its force upon the deeper structures, even this solution gives very little result. *Plantago major* is another remedy which seems to modify the severe neuralgic pains of this disease when used locally, and of which the external auditory canal is unusually tolerant. I use the fluid extract in diluted glycerine instilled into the ear as warm as can be borne. If the pain continues without abatement, careful inflation of the middle ear should be performed, which usually produces at least temporary relief. This is done preferably by means of the eustachian catheter and the air bag of Politzer.

I have known warm tobacco smoke to give marked relief when forced into the ear from a pipe through an eustachian catheter. If the pain still continues, and we find, upon inspection of the *membrana tympani*, that it is bulging from pressure of the confined pus, incision of the drumhead should be performed at once. When the bulging of the membrane is most marked in its upper portion, a free incision should be made through the greater extent of the posterior portion of the membrane from above downward. When the membrane seems to be yielding at its lower portion sometimes simple paracentesis with the ordinary paracentesis needle will be all that is required. As soon as an opening in the drumhead is procured the gentle use of Politzer's air bag is called for, preferably, when possible, in connection with the eustachian catheter, to assist in forcing pus from the drum through the opening. This purpose may be still further facilitated by the careful use of Siegel's speculum.

When it seems advisable to encourage local depletion, douching the incised membrane with warm water is indicated. The artificial opening should be kept from closing until the suppurative process has entirely ceased. The air bag may be used for this purpose, and when this is insufficient the probe should be used to tear open the incision. For this purpose the local use of cocaine is usually all the anæsthetic needed. If, in spite of these efforts, the artificial perforation closes while

the suppurative process is still going on, the operation for incision of the drumhead must be repeated. The treatment of the throat is not an unimportant factor in the management of this disease. Whenever the age and other conditions of the patient will permit I find the careful use of the post-nasal syringe of great assistance when the catarrhal inflammation of the pharynx is troublesome. This disease is often the result of a direct extension of an inflammation of the throat to the drum cavity through the eustachian tube, and many times, as soon as the pharyngeal symptoms are under control, the condition of the ear begins to improve. I have often given marked relief by syringing the posterior nares with a warm weak solution of salt water to which a little carbolic acid has been added. At other times I have used a weak solution of chlorate of potash in the same manner. I have also had good results from the application of nitrate of silver, ten grains to the ounce of water, directly to the mouth of the eustachian tube. Sometimes the application of a two per cent. solution of cocaine to the posterior wall of the upper pharynx relieves the irritability and relaxes the muscles of the pharynx, and brings about a condition favorable to the escape of the accumulation in the drum through the tube.

The treatment of the drum, *membrana tympani*, and external auditory canal, after suppuration has become established, is also a very important matter, for upon this depends largely the prevention of the extension of the disease. It seems to me there can be no doubt that while local measures may not be all that are necessary to control the disease and bring about a healthy condition, they are of great assistance in promoting the action of the constitutional remedies. The chief indications are the keeping patent the opening in the drumhead, in the manner described above, and the proper cleansing of the parts. It is my custom to carefully wipe out the canal and, so far as is possible, the drum, using the cotton holder armed with absorbent cotton. This should be done frequently day and night, and should be one of the duties of the attending nurse. When this

method does not reach the drum cavity, and pus remains there, it may be drawn out by means of an exhausting syringe made for that purpose. After thoroughly drying out the canal and middle ear I usually throw upon the floor of the canal a little finely pulverized boracic acid, being careful not to use enough to obstruct the flow of pus. I most thoroughly believe in the "dry treatment." I very rarely use the syringe for the purpose of cleansing, and I find, in the majority of cases, that I get better results without the use of the hydrogen peroxide. If it is used, the parts should be carefully dried afterward.

At any time during the progress of the disease a decided abatement of the symptoms may occur, only to be renewed with perhaps increased vigor. The disease should be considered safely under control only when the temperature has become normal, the pain in the ear and head entirely gone, and the swelling of the mucous membrane of the drum much reduced.

## PENETRATING WOUNDS OF THE CORNEA, AND THE NECESSITY OF CORRECTING THE RESULTING AMETROPIA.

BY SAYER HASBROUCK, M. D., PROVIDENCE, R. I.

Recently, or within the past few months, my attention has been forcibly called to a class of cases that, if I may judge by the past history of the three or four typical cases that I will call your attention to, have not as a rule received the attention that a more careful consideration of their condition would warrant. And I will plead guilty of neglect in the same line in reporting the history of the first case.

About a year ago a young man came to my office with his father, with the following history : As a boy, while at play, he was hit in the eye by a flying chip of stone, cutting the cornea, as I should judge from my examination, in the upper and outer quadrant fully three-eighths of an inch. This was followed by a prolapse and entanglement of the iris in the cut. Under careful treatment, the inflammatory symptoms subsided, leaving an anterior synechia and a pupil oval in shape, drawn up and outward.

The fellow eye having good vision by Snellen's distant test, and the injured eye not being able to read the largest letters, it was decided, or so it would now seem, to let the uninjured eye do the work. He thus completed the stipulated curriculum of his education, though, as he now says, always conscious that he had eyes, and that they were strained. From time to time he consulted the oculist who had so successfully treated him at the time of the accident, and he assured him that all was well, and that something besides his eyes must be the cause of the tired feeling or headaches he complained of. As the left eye, which was doing

the work, was good enough, and it was very evident from a test of the vision that the right eye was of no service, he thus went on from year to year. Having a scientific turn of mind, he was constantly asking of his eyes all that they were able to do, and at the same time forcing them to do all that his will power would allow them to do.

He had at times used a  $+0.50$  D. sp. This helped him but little, and he rarely used them. At my first examination, he completely made me believe that the vision of the right eye was so poor that it was not worth while testing; and the impression formed by an unaided examination of the general appearance of the eye, the location of the injury, the position of the pupillary space, etc., fully confirmed all that he said. I then examined the left eye under homatropine, and found the vision with a lens  $+0.50$  D. sp.  $\ominus +0.25$  D. cy., axis  $90^\circ = 1.0$ . I ordered this lens for the near vision with a plain glass for the right eye. He received but little, or no relief, of the symptoms complained of, and at the end of six months returned, saying that if I could not help him he would have to give up his present position as superintendent and chemist in a large manufacturing establishment; a position he had been striving for years to attain, and now that he had reached his goal, he felt that he could not perform the work demanded of him.

Having in mind a similar case that had recently been under our care, I decided to use homatropine in both eyes, and make a most careful examination of each eye. The result of this examination showed that the vision of the right eye with a  $+1.50$  D. sp.  $\ominus -3$  D. cy. axis  $170^\circ = 1.0??$  And that of the left with a  $+1$  D. sp.  $\ominus +0.375$  D. cy.  $90^\circ = 1.0$ . On the following day I ordered for constant use the following lenses: right eye  $+0.75$  D. sp.  $\ominus -3$  D. cy.  $170^\circ$ ; left eye,  $+0.25$  D. sp.  $\ominus +0.375$  D. cy.  $90^\circ$ . During the past five months he has been able to perform his work comfortably, the headaches have gone, and he no longer has that weary feeling, that drove him almost to a stage of melancholia, from the oppressed feeling about his head. His eyes, that usually were red and smarting, now feel comfortable, and his bottle of eye lotion, which had been fortified with a liberal amount of cocaine, etc., has been cast aside.

The result of this examination was far beyond my most sanguine expectations, in the way of the vision found in

the right eye. At the same time, I hardly dared to hope that his lot would be bettered by the use of glasses. The vision of the right eye, though good, it seemed to me, must of necessity, from the location of the pupillary space, be derived from a region of the retina far beyond that of its companion, the left, and it hardly seemed possible that binocular vision could be maintained for practical purposes; but here again I was astray, as the experience of time has demonstrated. The test of the double images by Stevens' phorometer demonstrated that nature in her willing way had found some means of adapting herself to the exigencies of the case, as the muscular balance seemed to be one of almost perfect orthophoria. At times the skilled hands of science are able to accomplish almost the miraculous, but when Nature with her handiwork steps in, her work is beyond comparison.

My next case is one that consulted my associate, Dr. Rogers, a few months previous to the final examination of the case just reported, and fell into my hands by chance, as the doctor was very busy at the time, and asked me to look the case over and see what I could make out of it, or suggest in the way of glasses.

This case was an injury to the cornea of the left eye from the blade of a pair of scissors, leaving an anterior synechia down and in with a distorted pupil drawn toward the wound. He conducts a drug store, and is one of the most enthusiastic amateur photographers in the State. Being greatly interested in this work, he has tasked his eyes to their full limit, and has been a great sufferer from headaches. Fully realizing that these came from his eyes he had consulted oculists, and was wearing a plain glass upon the right eye, and a weak convex cylinder upon the left. As these gave him no relief he decided to make another attempt to have his eyes corrected. The examination showed the vision of the right eye to be 0.8 and of the left eye 0.3, being much better than that of the former case.

Examination under homatropine showed the vision of the right eye to be with a lens of  $+0.75$  D. sp.  $\odot +0.25$  D. cy. axis  $100^{\circ} = 0.9$ ; the left eye with a lens of  $+1.50$  D. sp.  $\odot +0.50$  D. cy. axis  $60^{\circ} = 0.9$ . When the influence of the mydriatic had passed

off, it was found that with a  $+0.25$  D. sp.  $\ominus +0.25$  D. cy. axis  $90^\circ$  for the right eye the vision was  $0.9+$ , and for the left with a  $+1$  D. sp.  $\ominus +0.50$  D. cy. axis  $90^\circ$ , the vision was  $0.9$ . It will be noticed that the axis of the left is quite different from that found under the influence of the mydriatic, but the nature of the case I think will fully explain this variance. At any rate, good vision could be obtained at this axis and not at the former, and the final subjective test, usually, where positive in its character, governs our ultimate conclusion. As in the former case, the result of the use of these lenses has been a source of comfort.

This case differs from the other in the location of the injury and position of the pupillary space, as it was more in the line of direct vision, when the eyes were directed at a near point; and it seemed to me that the possibility of a good result was better; but the proof of the pudding is in the eating of it, and we will not theorize.

My third case is of more recent date, though time enough has passed I think, to prove the benefit of the glasses ordered. This was the case of a young man, aged twenty-one, who, while a boy, was injured by the explosion of a cannon, which he was watching fired on the 4th of July; and though it was not known just what hit him, still it was thought that a piece of glass from the bottle that held the powder which was broken at the time of the explosion, must have struck him.

His injury, like the others, was a cut of the cornea, followed by a prolapse of the iris, resulting in an anterior synechia and distorted pupil, down and in, of the left eye. At my first examination under homatropine, I found the vision of the right eye to be with a  $+1.50$  D. sp.  $=1.0$ , but the result of the examination in the left eye was not satisfactory; and the nature of the case being one of personal interest, I decided to try the effect of atropine, which was used for some days, and on examination I succeeded in getting with a  $-3.25$  D. sp.  $\ominus -1.25$  D. cy. axis  $90^\circ$ , a vision of  $0.8$ ; and when the influence of the drops passed off, the right eye with a  $+0.75$  D. sp. gave a vision of  $1.0$ , and the left with a  $-3.50$  D. sp.  $\ominus -1.25$  D. cy. axis  $90^\circ$ , gave a vision of  $0.8$ . These lenses were ordered for constant use with marked comfort.

While this case was under treatment, a fourth of a like kind came into my hands.

A man, forty-nine years of age, who, as a boy, was injured in the right eye by a stone cutting the cornea up and in, leaving an anterior synechia and dislocated pupil. The nature of his employment, that of a clam digger or oyster opener, not being a severe tax on his eyes, they had never caused him much trouble. At the same time his age rather forced him to consult me, as his near vision was becoming difficult; the understanding being that I should take my fee in spring chickens, when they were fit to kill. This I was quite willing to do, as a liking for spring chicken is a failing of mine.

His first statement as to the condition of his eyes was that the right eye had never been of any use, but the left had been good enough for any two eyes. The right, as he said, when he was a mere boy, had been injured by an auger that slipped from his father's hand while boring a hole. I found the evidence of a former cut of the cornea, with an anterior synechia and dislocated pupil almost directly in the vision; being less than 0.1, or only large objects; the vision of the right eye being 1.0. After the use of homatropine, I found the vision of the right eye with a lens of +4 D. sp.  $\odot$  -0.75 D. cy. axis  $75^{\circ}$  = 0.8; that of the left with a lens of +0.75 D. cy. axis  $35^{\circ}$  = 1.0.

When the mydriatic had passed off, I ordered for the right eye, a lens of +3.75 D. sp.  $\odot$  +0.625 D. cy. axis  $50^{\circ}$ , vision 0.9 ??; left eye +0.50 D. cy. axis  $35^{\circ}$ , vision 1.0. As he only wanted glasses for near vision, I ordered for the right eye +5.50 D. sp.  $\odot$  +0.625 D. cy. axis  $50^{\circ}$ ; for the left eye +2.25 D. sp.  $\odot$  +0.50 D. cy. axis  $35^{\circ}$ . With these he was able to use his eyes comfortably at near vision. As the case was one of a series that I had become interested in, I was anxious to find out what would be the verdict of one who made no other complaint than that near vision was becoming difficult. At the same time, he said that his eyes had never given him any trouble before. I told him of other cases of a similar nature that I had recently seen, and asked him if he was willing to try the constant use of glasses. He finally consented, and now says that he wants to put them on before he gets up in the morning.

Though this case does not come in the line of reflex eye symptoms, at the same time it is interesting to know that vision has more charms, under the circumstances, with the proper correction of the refraction error than without.

This being so, what would have been the condition of affairs, had his lot in life demanded more constant application of his eyes? While the muscles of accommodation apparently were able to carry the load during the years of their normal activity, it would seem that, as soon as the natural decline of their power set in, the use of the eyes began to make itself manifest upon the general nervous system. At the same time, if one was asked to pass a hasty opinion upon the possibilities of reflex symptoms occurring from the use of the eyes, where the vision of one was barely able to distinguish large objects, and that of its fellow was able to read Snellen's 1.0 with ease, and for over thirty-five years there has been no complaint, I am free to confess that I, for one, would have had many doubts about the subject.

The results of this case, however, are so positive that I shall no longer be in doubt. It has also been the cause of making me give more thought to the correction of the refractive errors of that class of eyes known as amblyopic eyes—eyes where the vision is little better than perception of light, and for which it has until recently been considered sufficient to correct the refractive error of its fellow, and order a plain glass, or any other lens that would balance the weight of its fellow lens in the frame, under the impression that it made little difference what was put in front of such an eye, as the vision was not such as is usually considered as useful. This custom I am fully convinced is wrong, even though we are not able to demonstrate that such an eye has vision sufficiently good for practical purposes. I am quite sure that we have not tests delicate enough at present to judge of the possible aid it may be to its fellow; at the same time, with the many and various methods at our command for objective testing of the refraction of such an eye, I believe it is our duty to correct whatever refractive error we may be able to find; and the result of doing so, in cases that have come to my attention of late, has fully demonstrated to my mind the soundness of this theory.

With the aid of retinoscopy, and Javal's ophthalmometer,

one can almost determine with ease the refraction of an optical box as it were. The practical result of this method, I am sure, will quickly force itself upon all who try it, and in many cases furnish the relief for reflex symptoms that have so long seemed to be caused by eye strain, but have not been relieved by the correction of the eye which alone seemed capable of performing its work. I fully realize that this is asking a good deal of time from the busy practitioner; at the same time I believe that a case well done does more for the future reputation of one, than half a dozen cases (so to speak) polished off to the satisfaction of the moment. The old proverb of "a bird in the hand is worth two in the bush," hardly works with one in a special line of work. It would be better to say that one case, well cared for, will bring two to the bush.

In conclusion it may not be out of place to speak of the various methods of examinations that I pursue in searching for my results in cases of this kind, familiar even though they may be to all.

After hearing the history of the case it is my habit to test the distant vision with Snellen's test types at five meters; then by retinoscopy determine if possible whether the refraction of the eye is hyperopic or myopic; and by oblique illumination, I investigate as far as possible the condition of the cornea, anterior chamber, iris, and lens. I then view the eye through Javal's ophthalmometer. If the result of this examination is not satisfactory I make use of homatropine, in the form of gelatine disks, suggested by Dr. Woods of Chicago. When the eye is under its influence I go over the same ground again. When it comes to the test by lenses, I find out all that I can in the usual way of running up and down, stronger or weaker, spherical or cylindrical lenses. If this test is not satisfactory, I resort to the use of the slit, which often, in cases of this kind, gives the best results. Having determined the best possible vision of the different meridians in this way, I remove the slit disk, and try the result with a combination of what would seem to be the proven sphero-cylindrical correction.

Should the vision not be all that previous tests would have one to believe possible, I begin to experiment with a combination of crossed cylinders, so called. At times, if all this is not satisfactory, and I believe that the case is capable of better results, I make use of atropine, and at times of late of scopolamine, the action of which so far seems very satisfactory, and oftentimes more agreeable to the patient, who may be susceptible to the disagreeable effects of atropine.

Having determined by these various methods the condition of the eye or eyes, I usually wait for the effect of the mydriatic to pass off, and again test the condition of affairs, and if this test is satisfactory, I order the correction found for constant use. If this test is not satisfactory, I again make use of atropine, and after due allowance, as it may seem best for the accommodation, I order the lenses that give the best vision, and continue a very weak solution of atropine for some time.

In calling your attention to this series of cases, I am fully conscious that many others, no doubt, have come to the same conclusion. At the same time I am prompted to report them from the fact that where others had failed, I had apparently been able to give relief.

The four cases that I have reported are by no means all that I have seen of this kind. At the same time, they have come one by one, so close together that they have forced themselves upon my attention. I have not investigated my records of cases in the past fully enough to say that I have not been as guilty as others in the treatment of these cases, but in making the statements that I have, I feel that I have shown that in future I will be more careful than in the past.

## MAKING A NEW NOSE WITH A SILVER BRIDGE.\*

BY SIDNEY FREEMAN WILCOX, M. D., NEW YORK.

On December 14, 1891, Miss X. came to me at the Flower Surgical Hospital to see what could be done for her face. The history given was that, when about eight years of age, she was hurt by a fall on the face and, as near as I can make out, a condition similar to noma set in, which was a long time in being cured.. At any rate there was extensive sloughing, which carried away the whole nose, the whole of the upper lip, and part of the lower eyelids and cheeks. The upper teeth were exposed and carious. She was very sensitive regarding her appearance, and at all times wore a large sun-bonnet, and when out of doors this was re-enforced by a heavy mask veil.

The nose had absolutely disappeared. The nasal openings were imperfect, and from the great loss of tissue there was a large cicatricial expanse which was white and contracted, and extended well up between the eyes and over the cheeks. The problem presented was a difficult one. How to build up a new nose on such unpromising soil, so poorly nourished, gave me much food for meditation.

Not much difficulty is experienced ordinarily in forming the soft parts of the nose. The flap can be procured from the arm by the Italian, or Tagliacozzi's method, or from the forehead by the Indian method; but obtaining the necessary bony support is a different affair, and of the various methods in use all were considered.

Sabine's method of grafting on a portion of one of the fingers was first thought of, but the poorly nourished con-

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dition of the tissues to which it would have to be grafted made it appear impracticable.

König's method, and the various modifications of it, by which a flap consisting of skin periosteum and a thin layer of bone are brought down from the forehead with the intent to cause a bony formation to grow in the newly made nose—were all thought over. One thing militated against this method, and that was the fact that the cicatricial tissue ran well up between the eyes and out on the forehead, necessitating an unusually long bridge, which might not be able to carry sufficient nourishment to the flap.

In looking over the literature of the subject I came across the following paragraph in the *Annual of Universal Medical Science*.—Issue of 1890, vol. iii. section J, page 17:

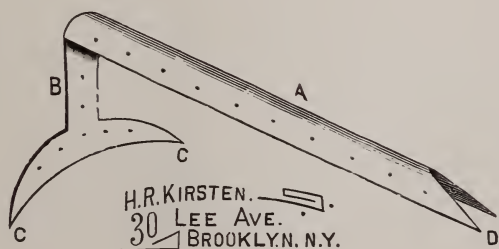
"While mainly dealing with the immediate correction of the deformities which result from the resection of the lower jaw, Martin describes his method's experience in rhinoplasty. He has been thoroughly successful as well as original, if we are to judge from the confirmation and praise which he has received from Ollier, Poncet, Letiévand, Gayet, Pollosson, and others.

". . . The great desideratum in rhinoplasty is a firm, resisting, and lasting framework. The laborious efforts of Rotter and the paper of Czerwinski sufficiently attest this, and prove that, notwithstanding all the ingenuity and constant endeavors of the ablest workers, the results are still unsatisfactory. Martin appears to have solved the problem. He first constructs a metallic framework, and fixes it by sharp points into the bone which surrounds the loss of substance; this framework is now prepared to be covered with the surgeon's skin-flap, which he may borrow from wherever he chooses. The operation presents no special difficulties; but what is the first result? Is the metallic framework permanently supported by the tissues? 'Yes,' says Pollosson, who bears witness to the success of Martin's operation in several of his own cases, 'provided that care is taken to prevent tension of the flaps, and that none of the ordinary

complications in such cases compromise their vitality.' After detailing some very interesting cases in which it is shown that the apparatus has been perfectly supported for years, Pollosson regards it as a fact at present established, that autoplasty on a prothetic base, as applied to rhinoplasty, has given very happy results. The foreign body is well supported by the tissues and answers admirably its supporting function. It is true that in rhinoplasty the mechanical conditions are particularly favorable to the maintenance of the apparatus. The 'cicatricial retraction of the posterior surface of the flap tends only to improve the appearance and to fix the apparatus more securely in the tissues; therefore, the cicatricial contraction, which in other localities would tend to expel the foreign body, in rhinoplasty would, on the contrary, tend to fix it and to establish the prothetic appliance as a permanent fixture."

On reading the above paragraph it struck me that here was the solution of the difficulty. Not having the original articles at hand, I was obliged to devise the metallic framework myself.

After taking measurements, I cut out a paper pattern which I had copied in silver by Mr. Kirsten. The support consisted of a strip of thin silver, trough-shaped, A, which



acted as a bridge. At right angles with this piece was a flat piece; B, which served as a column to support the bridge, and branching from the column were two sharp spurs, C C, which were driven into the upper jaw. The free end of the long piece, A, terminated in two sharp points, D, which were driven into the lower edge of the frontal bone. Small per-

forations were made at short intervals, so that the secretions from the granulating surface could escape readily.

The only error made was in not making the column, B, long enough. It was only about three-quarters of an inch long, while if it had been twice the length, the resulting nose would have been better proportioned and not so flat.

The operation was performed before the class at the hospital March 7, 1892.

First, a pattern made from chamois skin, soaked in bichloride solution, was placed on the forehead; the flap marked out and dissected up. The bridge of the flap had to be very long, as the cicatricial tissue extended between the eyes well up on to the forehead. Almost the entire covering of the forehead was required to get sufficient flap, and I was even obliged to encroach somewhat on the scalp. The line of the base of the nose was then marked out, and sufficient cicatricial tissue cut away to get a raw surface for the attachment for the flap. The artificial bridge was adjusted and the flap brought down from the forehead and stitched in place with fine black silk sutures. Two rubber drainage-tubes were put in position to keep the nostrils open. Next—in order to avoid the long process of cicatrization of the wound caused by denuding the forehead—the edges were drawn as closely together as possible, and the remainder of the raw surface covered with large strips of skin taken from the outside of the thigh. These flaps consisted of the entire thickness of the skin. They were rapidly dissected up with the scalpel, taking care to include only the skin and not the underlying tissue. These flaps were tacked in place with a few sutures, and over them was placed strips of rubber tissue to prevent the gauze dressings from sticking.

Of course thorough antisepsis was observed throughout the operation. All the wounded surfaces were dressed aseptically and carefully bandaged, so that undue pressure would not be made on any of the flaps. Healing progressed favorably, the only place not uniting perfectly being a small portion near the inner canthus of the left eye. The transplanted flaps on the forehead grew on without a particle of sloughing. On May 27, 1892, the pedicle was cut away and straightened. The patient was discharged from the hospital on the 14th of June, 1892.

It had also been my intention to restore the upper lip, and for that purpose she re-entered the hospital the following winter, but owing to the fact that the mucous membrane covering the alveolar process of the upper jaw had, from long exposure, taken on the character of integument, and also that the flaps would have to be brought from some distance, it was decided to leave well enough alone. The nose was pretty flat, but otherwise had kept its shape



very well. In order to prevent the nostrils from contracting, the patient inserted a small silver tube into each, a portion of each day. The little opening near the angle still persisted, and through this opening a small mucous polypus projected. This was removed and the edges freshened and stitched up.

It is now two years since the operation, and considering the conditions under which it was performed, the result may be pro-

nounced very successful. The only point in which an improvement could have been made would have been to have made the bridge higher, thus avoiding the flatness. It could not have been less broad on account of the irregularity of the nasal openings. Of course the cavity filled up considerably with granulations, which have to a considerable extent diminished the lumen of the nostrils. The appearance of the face has greatly improved, and were it not for the great mutilation of the other portions by the extensive cicatrix the cosmetic effect would be much more marked.

It has occurred to me since that in a similar case a better result might be obtained by turning the flap directly down over the metallic support instead of twisting it, applying the integumental surface to the support and the raw surface outward; then this raw surface might be covered with Thiersche's grafts. This would obviate the tendency toward filling of the cavity with new tissue. Of course everything in such a case would depend upon the vitality of the pedicle. I hope to have the opportunity of making the test at some future time.

In looking over the literature of the past two years one finds that much has been done in the line of facial surgery, and the combination of prosthesis with operative surgery offers a great field for future achievement.

## ON THE FUNCTION OF THE TYMPANUM.\*

BY PEMBERTON DUDLEY, M. D., PHILADELPHIA.

"The explanation usually given of the functions of the various parts of the ear is as follows: The waves of sound passing into the external ear are collected and directed into the auditory canal, and strike upon the tympanic membrane, which is thrown into vibration. *The chain of bones* connecting the tympanic membrane with the oval one *participate in the movement and convey it across the tympanic cavity.* Under the impulses thus communicated to it the oval membrane vibrates and likewise the liquid in the labyrinth, and so the filaments of the auditory nerve become affected, and the sensation of sound is transmitted to the brain."

The above lines are quoted from Silliman's "First Principles of Philosophy," published in 1859, and used as a text-book in hundreds, perhaps thousands, of schools and academies in the United States for quite a long period. The words "The chain of bones. . . participate in the movement (of the membrane) and convey it across the tympanic cavity" are not italicized in the text-book, but special attention is herein invited to that particular sentence.

If now, we examine the text-books of physiology in use by our medical schools, we shall see that, with more or less emphasis and distinctness, they nearly all express the same view respecting the auditory function. Taking up one of the latest works of this kind, viz., "Elements of Human

\* Read before the Hahnemann Medical Club of Philadelphia, March 13, 1894.

Physiology," by Ernest A. Starling, M. D., Lond., M. R. C. P., Joint Lecturer at Guy's Hospital London, etc., P. Blakiston, Son & Co., 1892, we read as follows :

"Stretching across the tympanum, from the membrana tympani to the outer wall of the internal ear, is a chain of ossicles, the malleus, incus, and stapes. The base of the stapes is inserted into the foramen ovale, being joined to its margin by a membrane. *This chain of bones acts as a system of levers by which the vibrations of the tympanic membrane are transmitted to the fluid in the internal ear.* The excursion at the end of the lever formed by the stapes is only two-thirds of the excursion of the handle of the malleus, so that in their transmission through the ossicles the vibrations are diminished in extent but increased in force."

There can be no question, then,—judging from these two authors and others whom we might quote,—that the view held by physiologists is that sonorous vibrations affecting the tympanic membrane are transmitted to the mechanism of the internal ear by movements of the ossicles *en masse*. This is the point which it is proposed to discuss in this brief paper.

It is somewhat significant that Professor Silliman, writing, not as a physiologist but as a student of natural philosophy, should have been impressed unfavorably by this theory of audition. Such, however, is undoubtedly the fact; for, on p. 300 of the work cited, he follows the language quoted, by saying "This explanation is exceedingly imperfect, as it assigns no use for many of the most complicated and delicate arrangements of the ear." There is also a somewhat peculiar statement on the preceding page where, speaking of the eustachian tube, he says, "when this is obstructed deafness results, because the air in the tympanum is prevented from vibrating freely." Just what need there may be for vibrations of the tympanic air, if those of the tympanic membrane are transmitted by the chain of ossicles, he does not say.

It was these last-quoted passages from Silliman that led

the writer, years ago, to question the generally promulgated teachings regarding the function of the middle ear. And yet it may be said that the argument implied in Silliman's statement about the effect of eustachian stenosis is not at all conclusive as against the commonly accepted theory. The modification of hearing caused by a slight change in the tension of the tympanic air could be brought about by an interference with vibrations either of the air, or of the tympanic membrane, or both. Such being the case, we may see that a study of the phenomena of eustachian closure alone is not likely to aid us much in solving our question.

But there is a well-known fact in the auditory function which, one would have thought, would have led to the abandonment of the old theory long ago, viz., that the ear is capable of transmitting and appreciating a *number of notes* of different pitch and intensity, at one and the same time; while it is evident that the movements of the ossicles *en masse* can account for the transmission of *but one* note at a time. For instance, if a note requiring for its production sixty-four complete vibrations per second (C of the gamut), should strike the tympanic membrane, it can be readily understood that the handle of the malleus could make the necessary sixty-four excursions and thus transmit the vibrations through the chain to the fluid of the labyrinth and the auditory filaments. But now suppose that at the same time the notes (E, G, and upper C) necessary to complete the chord should also impinge upon the membrane; how would it be possible for the manubrium to swing 64 times during one particular second of time, and in the same second to swing also at the rate of 80 times, and 96 times, and 128 times? Manifestly such a thing is a mechanical impossibility, and, in the writer's opinion, this consideration is, of itself, conclusive as against the accepted theory of audition, because it can account for the transmission of but one note or set of vibrations at one time; whereas the capacity of the auditory apparatus far transcends this limit.

Because of this palpable defect in the common theory of audition, the writer, during his fourteen years' work as instructor in physiology in Hahnemann Medical College (1876 to 1890), always endeavored to controvert it, and urged upon his students the exceeding probability that while it is possible that vibrations of the membrane can be, and in some measure are, transmitted in the form of *molecular* vibrations in the structure of the ossicles, it is far more likely that *most of them reach the internal ear through the air of the tympanic chamber by way of the round window*, or through the dense structure of the petrous bone; or, still more probably, through all these media combined. In order to judge of the plausibility of this view, let us glance at the structure and arrangement of the parts concerned in it.

First, it is important to observe that the *membrana tympani*, while nearly circular in its general outline, is so modified in form by the attachment of the manubrium as to favor the production of a larger number of "nodal points" of vibration; the superior portion of the disk being divided into two nearly equal parts in which the radiating fibers more nearly represent the shorter strings of a harp, while the other, and especially the posterior portions, contain the longer fibers. Not that the function of the radiating fibers corresponds to that of the strings of a musical instrument,—their relatively slight difference in length forbids the supposition,—but that even this slight variation adapts the various parts of the membrane to the reception and transmission of sonorous vibrations of different degrees of rapidity and intensity. This variation in the vibratory capacity of the different portions of the drumhead is still further favored by the varying tension produced in these parts by the action of the ossicles under the contractions of the *tensor tympani*. And the assertion has been made, from actual experiment, that the tympanic membrane is capable of responding to sonorous impulses varying from about thirty, to four or five thousand, vibrations per second.

Now, let us keep in mind a few other points connected with the anatomy and physiology of the auditory apparatus, and we shall be able to understand a possible mode by which they operate to convey the impressions of sound. First, the stapes, by the action of the intra-tympanic muscles, is in alterable relation with the fluid of the vestibule; thence, through the opening in the anterior wall of the vestibule, with the fluid of the scala vestibuli; thence, through the minute opening (the helicotrema) at the apex of the cochlea, and down the scala tympani to the membrane of the round window and the air of the tympanic chamber. Second, recent studies of this subject have shown that the movement of the ossicles by the action of the tensor tympani, not only produces the well-known "rocking motion" of the base of the stapes, but presses it toward the internal ear—drives it into the labyrinth in short—in which case it, of course, forces the fluid up one scala and down the other, pressing it against the membrane of the round window and increasing the tension of that membrane just as the origin of the movement increases that of the tympanic membrane. Third, we might mention, as having a presumed relation to the function of audition, the exceedingly dense structure of the petrous bone, for the evident purpose, not of furnishing additional protection to the ear apparatus or to the base of the brain, but with the more probable object of imparting an increased capacity for receiving and transmitting sonorous vibrations. Fourth, the presence of the reverberating mastoid cells, aiding in the transmission of sound through both the petrous bone and the tympanic atmosphere. No wonder that Silliman should have found that the old theory is imperfect in that "it fails to assign any use for many of the most complicated and delicate arrangements of the ear." It certainly exhibits but doubtful relation to any part of the mechanism above mentioned.

The fact that fluids are but imperfect conductors of sound has been long and much dwelt upon by teachers of

general physics and is naturally regarded as a difficulty—if we may so express it—in transporting sonorous vibrations from the tympanum to the auditory nerve filaments. Observations, some of them not very recent, seem to indicate that a part of this difficulty consists in inducing the vibrations to *enter* the fluid, the tendency being for them to be reflected from its surface. Submarine divers have stated that the report of a gun, fired from a ship at anchor near by, is heard with painful intensity, whereas a similar report from a moderately remote shore is heard but indistinctly or not at all. All practical physicians know the difficulty of perceiving sounds transmitted through water or other liquids, and constantly employ this very difficulty as a diagnostic aid. But while it is thus admitted that sounds do not pass with much facility from air directly into water, Muller has shown that if a tense membrane be stretched between the two media “the sonorous vibrations are communicated from one to the other with great intensity.” Just such an arrangement—of air, water, and intervening membrane—exists at the round window of the tympanum. If, again, there be attached to the intervening membrane a short solid body, occupying nearly the entire membranous surface, it is found by experiment that sounds are communicated throughout the arrangement without much diminution of intensity. And precisely such an arrangement exists in the stapes and its junction with the fenestra ovalis. Still further, if, in this combination, “the short solid body above mentioned be connected by its other end with the middle of a vibrating membrane which has air on both sides of it, the transmission of vibrations to the fluid is rendered much more perfect.” (See Kirkes’ “Physiology”; 12th edition, p. 576). And here we have a combination, or mechanism, precisely similar to that existing in the tympanic membrane, cavity, ossicles, and oval window. I venture the prediction that it will yet be demonstrated that the sound-transmitting power of this “intervening membrane”—or of the solid body attached to it—*is modified by the degree of pressure exerted by it against the liquid,*

and that the "piston movement" of the stapes will thus be explained.

In relation to the views expressed in this brief paper, it is interesting to note the following remarks from so distinguished an otologist as Dr. Henry C. Houghton of New York. In discussing one of the papers read before the World's Congress of Homeopathic Physicians and Surgeons, at Chicago, in June, 1893, he said :

"I would hardly say to-and-fro motion of the drum-head, because I think the expression is liable to perpetuate the notion which is so firmly fixed in the minds of physiologists, that the drumhead moves as a whole, with a to-and-fro motion. It certainly does not so move in the ordinary function of audition, but stands as the iris does, as an adjuster, a regulator of sound-force. . . The vibration of the drumhead is at every node ; every portion receives impressions which are converted into molecular disturbances of varying lengths, according as they are produced upon the stiff and unyielding portions of the membrane at the periphery, along the manubrium, or in the more attenuated and easily yielding portions which lie between these two areas. Not only so, but these impulses are communicated to the contained air of the tympanum, and make their impression upon the acoustic nerve through the round window synchronously with the impression made through the ossicula." (Transactions of the World's Congress of Homeopathic Physicians and Surgeons, pp. 438, 439.)

There is no need that the writer should express his pleasure at such a corroboration as the above, and from such a source. Probably no physician living is better qualified to appreciate the physiological relations of the different parts of the auditory apparatus than is the author above quoted. With this prominent exception, the latest edition of Kirkes' "Physiology" is the only authority within my acquaintance that throws any doubt upon the time-honored theory of audition usually taught ; and even Kirkes, while mentioning the results of the late experiments

bearing on the subject, does not speak out emphatically against the prevalent notion.

The object of this paper is twofold. First to show that the long promulgated view, of the transmission of sound-waves by the "swing of the ossicles," is absolutely untenable and unworthy of consideration, and for the purpose of directing research into a different channel, in the hope that the actual truth may yet be arrived at. And secondly, to suggest another explanation of the auditory function more in accord with the known laws and principles of acoustics, as well as with the results of recent observations and experiments.

## CANCER OF THE ESOPHAGUS.

BY LOUIS A. BULL, M. D., BUFFALO, N. Y.

"Though cancer of the gullet may be regarded as the typical disease of that organ, it is not relatively common; Ziemssen finding primary cancer of the gullet only 13 times in over 5000 autopsies, while Dr. Walshe states that out of 8289 deaths from malignant disease in Paris but 13 were ascribed to cancer of the esophagus."—*Morell Mackenzie*.

I am indebted to Dr. DeWitt G. Wilcox for the following case, which came to me August 16, 1893.

Mrs. J. H. B., æt. forty-three, married, one child. Seven years ago had a miscarriage, since which time she has had uterine trouble. For several years has been troubled with indigestion, constipation, and piles. The stomach symptom most annoying was the formation of gas, of which at times she was almost unable to rid herself: generally, however, by beating herself over the region of the stomach for a few minutes she would obtain partial or complete ease for the time being. With the symptoms of indigestion there was a feeling of fullness over the scrobiculus cordis, and a sensation as of a lump in the throat, which came and went; during the presence of this there was dysphagia, gradually becoming more and more persistent, and in November, 1892, swallowing hurt her (in her phrase) "at the top of the throat." For some time previous she had eaten slowly. In the summer of 1891 she had an attack of sore throat, when she suffered from pain and hoarseness; this soon passed away, and never afterward was there any laryngeal complication. About the 1st of April, 1893, she had a uterine polypus removed and the uterus curetted, and the last of June the American operation for the removal of the pile-

bearing inch was performed. These two operations, skillfully done by Dr. Wilcox, gave entire relief in the pelvic region. While in the Wilcox Hospital, convalescing from this latter operation, she had the first stoppage of food,—some fish; from this time she was obliged to render her food liquid, and such as she was able to swallow would at times lie in her stomach for hours without being acted upon.

With the exception of the above, and a scrofulous eruption when a young girl, she had been an ordinarily healthy woman. Her family history was good, excepting the case of her father, whose death had a strong suspicion of cancer of the stomach about it. As I first saw her she was tall and thin, with ruddy cheeks, no signs of cachexia. The message she brought from Dr. Wilcox was that I should "pay particular attention to the esophagus."

On examination there was seen a very roomy pharynx. The constrictor muscles were much atrophied, and the connective tissue normally existing between the pharynx and the spinal column seemed to have been entirely absorbed, so that the vertebræ showed very plainly. The larynx was normal; there was a constant accumulation of white frothy mucus in the laryngopharynx, which was annoying. The shrinking in the submucous tissues was also seen in the nose, together with the formation of a tenacious mucus. Dysphagia was marked, the stricture being located in the upper third of the gullet; yet pressure over the cricoid did not produce pain, a symptom of early carcinoma of the gullet, according to Harrison Allen. She had a great longing for solid food, when she saw it upon the table, yet felt the necessity of abstaining, due to lack of ability to swallow and knowledge of her slow digestive power. With these facts before me, a guarded diagnosis was made of *stricture of the esophagus*, accompanied by, and perhaps due to, atrophy of the constrictors, leading to a spasmodic action of the pharyngeal and esophageal muscles.

No prognosis was given. In the line of treatment, local measures were adopted for the relief of the respiratory dryness and the removal of the tough secretion. Faradism was applied over the pneumogastric at the lower and anterior part of the neck, with the idea of toning up the muscular structures of the pharynx and esophagus, these receiving their innervation from the vagus,

and also relieving, if possible, the muscular irregularity and spasm. Under these procedures she improved a little ; was able to swallow liquid food much better, principally raw eggs beaten up in milk. I saw her seven times before August 29, when I left the city for two weeks, up to which time there had been a moderate gain in the weight and general condition. On my return, September 13, I saw her and at once noticed a change ; she was not so strong and complained of renewed difficulty in swallowing. Passing the laryngeal mirror into the pharynx, I was startled to find a warty-looking, nodular growth of the size of a bean pressing itself up from the left post-laryngeal region, yet having no connection with the larynx. This was vascular and bled easily. Studying the case anew, and further reference to the authorities, led me to believe that my worst fears were realized, that the case was one of epithelioma. I at once informed Dr. Wilcox of my decision and found that he had feared some such outcome. We decided not to inform the patient of the status of affairs, but would await the return of the husband from a business trip. The *pros* and *cons* of a radical operation were discussed, but my verdict, fully concurred in by Dr. Wilcox, was against operative interference, such opinion being based on the experience of Mackenzie and corroborated by the author of the article "Tumors" in the "American Text-Book of Surgery." With the change in the local conditions the purpose and form of the treatment changed. Every effort was made to so toughen the new growth, which trebled its size in two weeks, as to reduce the danger from hemorrhage. That the technique adopted answered the purpose is shown by the fact that, while twice considerable portions sloughed off, there was little bleeding, and only once was there the slightest necessity for the use of Mackenzie's tanno-gallic acid, with which she was supplied. The parts were thoroughly cleansed of the secretion, now changed to one of a tough, stringy, brownish character, and aqueous hydrastis freely applied. Internally she was given conium, of which she had many symptoms ; notably, the "dislike of society and yet dread to be alone," of Dunham ; the conditions of digestion, stool, and appetite were well marked.

Under this régime she continued in my care until October 18 when her husband (anxiously looked for on my part) returned. He was at once informed of his wife's condition, and finding that I

had no hope to offer, he asked if there were any objection to his taking his wife elsewhere, and received my ready assent. They went to a first-class man, and in order to obtain his unbiased opinion, led him to believe that they had come to him from their family physician. His report to the latter lies before me as I write, and in it he says: "The growth is not an epithelioma. If by any possibility it may be cancerous, scirrhus is its name. It is my opinion that this is a diseased gland similar to the condition which is found in the bronchial glands." He advised its immediate removal and in a few days operated for that purpose, removing several pieces of the growth. These were at once submitted to Professor Wm. C. Krauss, M. D., of Buffalo, an expert pathologist, who, after a thorough examination, pronounced the growth an epithelioma.

The patient was taken home and put to bed, from which she practically never again arose. She suffered intense pain in the throat, was utterly unable to swallow, and to add to her dilemma, the rectum almost entirely refused its services as an organ for the reception of food. She was operated upon October 21; but as the promises of a quick, painless operation and speedy relief were promptly negatived by the results, as given above, she was taken from the hands of the specialist and returned to the care of Dr. Wilcox. At his request, I saw her again November 6, to give an opinion upon a tumor which had appeared upon the front of the neck, in the region of the thyroid gland, and also to mitigate, if possible, the intense dryness of the membranes of mouth and throat. After a careful examination it was decided that the tumor was an enlargement of the thyroid, due to some connection with the cancerous condition in the esophagus. This opinion was confirmed a day or so later, when, after spitting up a few mouthfuls of pus, the tumor in the neck was found to be gone. It filled up and relieved itself in a similar manner two or three times before she died. I saw her twice after this before her death, which occurred November 26, 1893, but the last time made no examination on account of the exceeding weakness of the patient. This is to be regretted, as it might have given some inkling as to when certain glands in the post-pharyngeal wall became implicated, as was found *post mortem*.

An autopsy was made November 27, by Dr. Wilcox, with those present who had at any time had charge of the patient. The

body presented the most complete condition of emaciation ever seen by the writer ; every bit of subcutaneous fat was absorbed, and the muscular structures were but a mere shadow. An incision was made from the tip of the chin to the tip of the ensiform cartilage ; another from the tip of the chin to the angle of the ramus of the lower jaw upon both sides, and still another across the upper portion of the chest, about ten inches long and crossing the first incision at right angles. The integument was dissected back clearing the anterior half of the neck and the front of the chest. The thorax was opened by removing the sternum and the costal cartilages, and it was noted that the lungs were withdrawn from the chest wall fully three inches, except at the upper and back portion. An examination of the gullet was now begun from its point of passing through the diaphragm upward, and its thoracic portion found normal. The dissection was then carried into the deeper portions of the neck, and the esophagus, freed from the surrounding structures, was removed, together with the larynx and the oro-pharynx. A sinus was found passing in a tortuous manner from the cancerous mass around the left side of the larynx to the thyroid gland, through which, as has been told, pus escaped on three occasions. The esophagus was then opened from behind the incision extending from below upward to within one-half inch of the junction with the pharynx. An organic stricture was found fully four inches in length occupying the cervical portion of the esophagus, and this was crowned by the cancerous mass. The upper surface of this latter was neatly and cleanly shaved off as at the time of the operation and when the family were told that the entire growth was removed. Upon the wall of the oro-pharynx were found four small epitheliomata, each the size of a pea. These formed the only extension of the cancerous condition into the surrounding glandular structures, and the exact time of their advent is, unfortunately, unknown, though it must have been within two weeks of the patient's death.

Several interesting points are brought out by a study of this case, one of which is the much greater frequency of the disease in men. In Mackenzie's one hundred cases seventy-one were males. Remarking upon this he says: "The greater predisposition of men to esophageal cancer is remarkable, because more than twice as many women as

men die of cancer; that cancer of the stomach—which in its liability to irritation is exposed to the same conditions as the gullet—is equally common in both sexes; and that excluding cancer of the sexual organs, which is disproportionately frequent in women, malignant disease affects both sexes in an almost equal ratio.”

The most important point at issue now is: When did this case become cancerous? Does the malignancy date back three or four years to the time when she began to have trouble in swallowing; or, is it of only a few months' duration? I incline to this latter view, which the history, as given above, seems to prove. Dr. Hilton Fagge in *Guy's Hospital Reports* mentions a case in which cancer supervened on simple stenosis, while Morell Mackenzie reports the following case: A very nervous woman consulted him for dysphagia. Passing the bougie and the administering of nervous tonics gave her great relief. She frequently consulted him, and he considered her case as “functional.” Judging, however, by cases that afterward came to him, he concludes that her symptoms were due to chronic inflammation of the esophagus. After she had been for ten years under his care she was found to have a cancerous growth protruding from the orifice of the esophagus, and within a few months she died from extensive epithelioma. He considers it much more probable that the cancer originated as a spot chronically inflamed than that malignant disease existed, masked, all the time. I consider this case a remarkable parallel to my own. The question of making an esophagotomy or gastrotomy is one of the greatest importance, yet many things would seem to contra-indicate their performance in a case of malignant disease; the first and foremost being that the impression made upon the system by the cancerous condition prevents any advantage being taken of these artificial methods of getting food into the digestive tract. Death from starvation is the end.

## DISLOCATED LENS—TWO CASES.

BY D. A. MacLACHLAN, M. D., ANN ARBOR, MICH.

Normally the lens is so firmly fixed by its suspensory ligament as to remain in place under the severest shocks or shakes of the head. There are conditions, however, which render the lens quite liable to displacement even under ordinary circumstances. In such cases there is a lack of integrity in the suspensory ligament, possibly local in some instances, but generally in connection with some diathesis. The ligament which supports and suspends the lens from all sides, and ordinarily holds it firmly in place, is weak in such subjects, and is therefore easily stretched or ruptured, so as to allow the lens to slip away from its normal position. It may move outward or inward, upward or downward, or, it may tip a little forward or backward at its edge. It may be displaced entire, to one side, forward into the anterior chamber, or backward into the vitreous. Thus, there may be partial or complete luxation, and the complications or results are likely to be proportionate with the degree of displacement.

Displacement may occur without any such predisposition. Injuries or diseases are generally the causes in these cases when the ligament is stretched or ruptured by mechanical violence, or by inflammation and degeneration.

When a lens is displaced vision is greatly disturbed. If the ligament is merely torn, the lens at once assumes its greatest convexity, as it does in viewing an object at the near point, and would require a concave lens to give good vision. If the lens is moved laterally so that the edge may be seen in the pupil, there is a double refraction in the

same eye. In one part the lens is absent and the refraction is the same as after a cataract extraction; in the remaining part it will depend upon the thickness of the edge of the lens which still refracts rays of light passing through that part of the pupil.

If the displacement is complete, the eye refracts like an aphakic one, and a strong convex lens gives good vision if the media remain clear.

The diagnosis of dislocation is sometimes easy. If partial, the rim of the lens is seen as a dark border in the pupil. The part in which the lens is absent looks black; that in which the lens is still present looks grayish black. The ophthalmoscope may give a double view of the fundus.

The iris is deprived of its support by the removal of the lens from behind it, and becomes tremulous at that part (iridodonesis) whenever the eye or head is moved. If the lens is entirely displaced, the whole iris is thus tremulous. Should the lens be opaque the diagnosis is easy, as the edge is plainly seen in partial luxation.

When the luxation is complete into the vitreous chamber, the lens may be out of sight, except by the ophthalmoscope. With the latter, it may generally be seen lying in the lower part of the chamber. The tremulous iris, entire absence of accommodation, extreme hypermetropia and deep anterior chamber are additional signs.

It is sometimes displaced forward into the anterior chamber, pushing the iris before it, as in advanced glaucoma. Adhesions then take place between the capsule of the lens and the iris and cornea. It may become calcareous, or shriveled eye, so as to pass through the pupil, moving about more or less as a foreign body in the aqueous humor.

A lens may be dislocated and no serious consequences result, but often the consequences are disastrous to the eye. One partially luxated may remain transparent for a long time, but in complete displacement it usually soon becomes opaque. Inflammation of the iris and ciliary body is generally set up, glaucoma supervenes, and the eye is soon destroyed by the inflammation and increase of tension.

The treatment of a partial dislocation, when the lens remains transparent and the eye free from irritation, consists in prescribing the proper glasses.

If irido-cyclitis or secondary glaucoma has been excited, the extraction of the lens is indicated. This is more or less easy when the displacement is lateral or forward into the anterior chamber, though frequently through loss of vitreous and other accidents, the vision or even the eye may still be lost. When it is prolapsed into the vitreous chamber, its removal is very difficult if not impossible. Often it cannot be brought forward to engage in the incision made for its exit, although several very ingenious devices have been adopted to accomplish this. When removal is impossible, inflammation and increase of tension may be combated by an iridectomy as for glaucoma, or paracentesis of the posterior chamber may be practiced. But these measures rarely suffice to arrest the disease process, so that the eye is apt to become entirely blind. When sight is gone and the eye is painful and inflamed, enucleation is the best if not the only procedure to be adopted. The other eye is in danger of sympathetic inflammation in such cases, and often only radical measures can avert complete blindness.

Congenital cases frequently if not usually remain unaltered and only require treatment for the correction of defective vision, which is almost always present. In the early history of operation for cataract, reclination or pushing the lens down into the vitreous chamber was constantly practiced, but even in these cases of intentional luxation disastrous results almost invariably followed.

The following cases in the writer's own practice illustrate many of the phases of the subject :

Mrs. —, aged fifty-eight. Consulted me concerning pain and inflammation of the right eye. About thirty years previous, something peculiar occurred in the eye, during a very severe and tedious confinement. A grayish body could be seen later in the lower portion of the pupil, which after a time disappeared altogether. Three or four years before her visit to me a white body had appeared in the anterior chamber, and not many months

after she began to have spells of photophobia, dim vision, redness, and profuse lachrymation of the eye, accompanied by extreme neuralgia of the eye and head. At first these spells lasted only a few days at a time, but gradually became more prolonged, so that the recent ones lasted for weeks. She had, of course, various other constitutional symptoms brought on by the suffering endured.

On examination the eye was very red, somewhat prominent, cornea hazy and anæsthetic, iris muddy, pupil slightly dilated and grayish, and tension decidedly increased. It was *very* sensitive to light, the lids greatly swollen and spasmodically closed, and when opened forcibly there was a gush of tears. In the anterior chamber a whitish body, about three-eighths of an inch in diameter, floated about in the aqueous, upon every movement of the eye.

A diagnosis of dislocated lens with absorption and atrophied lens capsule was given, and operation for extraction decided on. During the night before the day set for the operation, the little body disappeared behind the pupil, but reappeared in the forenoon following. Eserine was at once instilled into the eye to contract the pupil and prevent its slipping back again.

The eye was cocaineized, a section of the upper third of the cornea was made with a Graefe knife as for cataract extraction, and the substance removed. It proved to be a shriveled lens capsule, as was suspected.

The patient remained under treatment for the inflammation, which gradually subsided, and she returned home apparently well.

CASE II. Mrs. M., æt. forty-two, American, married. Father died at fifty-six of fatty degeneration of the liver. Mother at fifty-one, of epilepsy. A brother died of consumption. A sister had floating cataract, which was removed and glasses fitted.

When twenty years old she had measles which left her with a "bad throat." Had paralysis fifteen years ago, grippe two years ago, and sciatica a year since. Has one child, and had a miscarriage twenty years ago. Eyes were "near-sighted" when three years old. When eleven years old was hit on the right temple with a snowball, and the lens of the right eye was dislocated. Eight or ten years ago, something green came over the left eye, and it has been more or less inflamed ever since.

When she consulted me April 24, 1893, she was having great pain about the eye extending to the back of the head and worse from heat. The left eye was congested, seemed too prominent, and tension  $+2$ . The iris was tremulous in both eyes. Distant vision of the right eye was  $\frac{20}{200}$  and  $+7D^s = \frac{20}{80}$ . For reading  $+12D^s =$  Jaeger 5. She was wearing a  $+6D^s$ . Vision was *nil* in the left eye.

On dilating the pupils, the lens of the left was seen to be dislocated upward and inward, the edge being just outside the border of the undilated pupil. By the ophthalmoscope the lens of the right could be seen lying immediately below the pupil in the vitreous chamber, where it had probably lain for many years.

The fundus of both appeared nearly if not quite normal. The visual field was normal also in the right.

She had also catarrh of the nose and throat, with a spur in the left nostril, and enlarged and cystic tonsils. The eustachian tubes were open, but her hearing greatly impaired, so that she had used an ear trumpet for years.

Under the use of eserine locally, and mercurius, bryonia, and other remedies internally, as indications presented, the tension was reduced and pain and congestion relieved, so that she went home after six or eight weeks apparently well, promising to return at once if any signs of renewed irritation showed themselves.

October 1, she again presented herself. During the summer the left eye became painful, but within a week she was seized with an attack of acute rheumatism which confined her to the bed for several weeks. Meantime the eye became worse and worse, so that when I again saw her, it was intensely congested, tension  $+3$ , pupil fixed, cornea hazy, and the lens crowded forward directly against the cornea, carrying the adhered iris in front of it. She was having intense neuralgia of the face, neck, and shoulder, with serious systemic derangement.

Nothing gave her much relief. I made a posterior sclerotomy which reduced the tension promptly and relieved somewhat for a time, but all the symptoms returned as bad as before.

The other eye began to show signs of irritation, hence I enucleated the left. The right was promptly relieved, and the neuralgia ceased. The systemic derangement continued for a time, but a few weeks later she was discharged cured.

## MUSIC AS A MEANS OF AURAL MASSAGE.

BY HENRY C. HOUGHTON, M. D., NEW YORK.

The evolution of massage by sound is a very interesting subject, aside from its value to the deaf. Students of physics will some day deal with this matter aside from its therapeutic bearings, and will, no doubt, help materially in its development in that direction.

So far as the writer is aware, Mr. J. A. Maloney, now Dr. Maloney, of Washington, D. C., was the first one to hint at sound, as a means of improving the hearing, and his instruments were shown to the American Otological Society, at the meeting held in New London, Conn., July, 1887. The "Otacoustic Treatment," as it was called by the originator, did not make a profound impression upon the profession at that time. My attention was called to the method by Samuel Sexton, M. D., of this city, and later on, by cases reported in the *Hahnemannian Monthly*, July, 1890, by Dr. W. R. King, Washington, D. C. There was a difficulty in applying the treatment generally, on account of the conviction of the inventor that each case needed his personal attention. In this way, the value of the treatment was circumscribed by the environments of Washington City. Since the use of the phonograph I have had an opportunity of watching the effects of the otophone upon a very difficult case of chronic catarrhal inflammation of the middle ear, with thickened membrane and rigid ossicles, and must confess that the instrument embodies the principles which are now applied in various ways, by various persons, for the purpose of reducing the rigidity and modifying the nutrition of the auditory apparatus.

In February, 1892, a well-known publisher of this city urged me to visit Baltimore in order to determine the truth concerning reports of a new and wonderful method of treating the deaf by the phonograph. I was unable to leave the city at the time, but, influenced by his well-known ability and recognized judgment, I gave him a letter to Professor H. E. Garey, and awaited his report. It was so remarkable that I devoted the evening of March 2, 1892, and the day March 3, to a very full study of Professor Garey's methods. One case, in the person of a German man, past seventy years of age, had been restored from a deafness that was practically absolute, so that he could converse with me at a distance of twenty feet with perfect ease, the hearing for the watch in both ears being about the same, and, if my recollection is correct as to the record, above  $\frac{1}{2}$  ft. I immediately made arrangements to adapt a phonograph, and just two years ago to-day began the work with the phonograph, adapting, with the aid of the experts of the Phonograph Co., the cylinders to the purpose. I soon recognized that which Dr. Garey recognized—the necessity of a more perfect instrument; and in June, 1892, began my experiments with the reed organ. I was led to this after seeking advice of Dr. Audsley, of this city, an acknowledged authority in acoustic and musical science. From his suggestions, I first started to secure a stringed instrument similar to a hurdy-gurdy, intending to adjust the strings so as to give a great variety of vibrations, and to conduct them to the canal and drumhead by means of the stethoscope. In order to find the proper instruments, I applied to my friend and patient, Mr. Joseph Matthews of the Mason & Hamlin Co., an expert in the building of reed organs. While debating the matter, I suggested the probable adjustment of a reed organ in the place of stringed instruments, and, to my great delight, found in the store-room of the company a small model, which Mr. Matthews fitted for experimental purposes. The immediate results were so satisfactory that I proceeded to have him construct for me a small reed organ, according to our mutual ideas, and it is this

which has been the germ of the entire matter now presented, in its perfection, in the reed organs made for me and for my friend, Dr. Wilson of Meridan, Conn., by the Wilcox & White Organ Co. of that city. I desire in this connection to acknowledge my indebtedness to Dr. Wilson, and to place on record my appreciation of his fraternal kindness in responding to any demands which I have made upon him.

Turning now to the results of two years' study and observation, we will note the effects of massage upon the canal, drumhead, tympanum, internal ear, and head. Upon producing powerful massage, a sense of heat and itching, with decided hyperæmia, upon inspection, is produced in sensitive patients. The same upon the membrana tympani, with injection of the peripheral circulation and the injection of the plexus about the manubrium of the malleus. In many cases the area covered by Schrapnell's membrane is decidedly affected. The tympanum must share in the same effect, as some patients speak of a tickling, itching thrill, which extends through the eustachian tube to pharynx and posterior nares. The effect upon the nerve is such that subjective sounds, as induced in the great variety of tension, are decidedly modified in the great majority of cases. Not only so, but the perception of the auditory nerve is decidedly diminished temporarily, and made more acute afterward. Not only this but subjective symptoms of the entire head are produced, and objectively, increase of the secretion from the entire mucosa of the head. In a few cases soreness of the muscles of the back of the head and neck, even to the shoulders, has been produced, and in very many cases discomfort and tension in the occiput, very similar to that now recognized as "eye strain."

These facts impressed my mind very early in my experience with the possibility of bad effects from excessive massage, and I have come to recognize the necessity of the greatest care in the application, and of dealing with each ear separately, with as great care as one would exercise as an oculist.

As a means of diagnosis, I believe that musical tones will prove of the greatest value in determining the condition of the auditory nerve, being used through the tympanum, and compared with tones conveyed from the same instrument directly through a suitable wooden or metal conductor, as we ordinarily test bone conduction. A careful differential diagnosis may be made of the perception of high and low tones from the 16 ft. tone of the lowest octave to the very highest of the piccolo of the 8th octave. Without marking these by the terminations used among musicians, the record may be easily made, recording the lowest octave as one, and giving the letters or numerals from that to the highest octave.

As a means of prognosis, I believe that musical tones offer a wide field for study, and great encouragement to anticipate a clearer and more definite prognosis in aural diseases, just as we shall advance in the diagnosis, and the settlement of the problem of middle ear or internal ear lesion, to a difficult question whether the internal ear lesion is primary or only secondary to that of the middle ear.

As regards present needs, it is my conviction that it is impossible to render the greatest good to our patients without instruments suited to careful discrimination of the effects of irregular tones, as well as regular tones. I question indeed, whether even the tones of the organ supplement all that is required, as experiments with the violoncello demonstrate the value of vibration of stringed instruments in the study and treatment of some cases.

One of my earliest patients was a German merchant, who later on introduced me to a celebrated inventor interested in the telephone patents. I then experimented with a vibrating diaphragm, hoping to find a solution for the development of irregular tones, but was under obligations not to give any publicity to the matter until the expirations of the telephone patents. Since that time, you are all aware that this matter has been practically applied, and by the courtesy of the Waite & Bartlett Mfg. Co., of this city,

I am enabled to show you an instrument which in my judgment fills the demand more fully than any that I have seen or heard described. It is an adaptation of what is known as the Englemann coils, as constructed by the company, according to the instructions of Professor Englemann, which Mr. Waite will demonstrate to persons interested in observing. This instrument is adapted so that it will give vibrations at the rate of from ten per minute to five thousand per minute. It can also be used as an audiometer for finding the perception of each ear separately or together. In addition, it can be used, as Professor Englemann's coils have been used, to modify the nutrition of mucous membrane, to rouse the vitality and contractility of the muscles of the eustachian tube and tympanum, and, in fact, to produce all the tissue changes that the induction current is known to produce. By a slight addition and modification of the battery power, the instrument can be adapted for the generation of ozone for office practice.

This paper is too long, but I cannot dismiss the subject without referring to two extraordinary results which I have obtained.

April 17, 1893, Miss P., age fifty-seven ; had grip two years ago for six weeks, complicated by pneumonia, dysentery, terminating with otitis interna exudativa serosa. The hearing  $\frac{2}{3}$  in right, —20 left ear, bone conduction negative. At the time of the attack, the vertigo was so great that she was unable to lift her head from the bed, for a period of time which she is not able to fix. There was also nausea and vomiting. One of the aurists of the opposite school diagnosed the case, and stated that the power of the left ear was absolutely negative. After two weeks' treatment she heard the watch on contact. On the 10th of May the massage produced the same symptoms in the occiput that she had at the time of the attack two years before. On the 26th of May she returned to her home in Connecticut, having been relieved of the discomfort which existed over the entire left side of the head, feeling that, in some sense, the natural sensations of that half of the head had been restored. She was given onosmodium to use for the occipital distress.

October 24, had had only one headache since May 26. Remained under treatment until November 20.

During the month of October catarrhal secretions of the head became profuse, and the left ear more natural, perception of tones increasing. On the 9th of November she attended a concert, and heard the tones of the orchestra with great satisfaction. She then remarked that when first attacked the lower tones of instruments were especially disagreeable. She received then *chenopodium anthelminticum*, and continued treatment until the 20th of November. At that time, the perception of the high and low tones through the instrument was nearly perfect.

January 16, she reported relief of the head, and only one attack of headache.

In view of the recognized diagnosis, I submit that the result is extraordinary.

September 28, 1893, Mr. W. J. L., age twenty-six, came to my care, suffering with facial paralysis of the right side for nineteen months. He had suppuration, the result of scarlet fever, from childhood, which had healed at ten years of age, remained so until fifteen years of age, suppurred again from seventeen to eighteen, and had persisted since that time. The right drum-head was perforated, eustachian tube closed, vertigo on standing. It was impossible to close the eye, or to close the mouth so as to whistle. He was under treatment until January 17, 1894, when the paralysis had practically disappeared; being able to close the eye and the mouth, suppuration reduced to a mere trace, and the general condition markedly improved. The prognosis, however, is unfavorable, as there is loss of vital force in special functions, deficient memory, extreme irritability, which certainly is suggestive of possible meningeal complication.

The conclusions reached are that aural massage by music offers a means of treatment supplementing internal medication that is offered by no other method; that it is perfectly safe in skilled hands; that there are possibilities of mischief in unskilled hands; that it will supplement our well recognized methods of diagnosis and prognosis, and that whatever discredit may have been thrown upon it by the fact that it

has been seized by charlatans, will not prevent its eventual recognition.

The adaptation of the Englemann induction apparatus consists in placing in the secondary circuit a magnet acting on a metallic diaphragm, the vibrations of which are conveyed to the external auditory canal by an ordinary stethoscope. The interruptions are regulated by slow or fast revolving wheels as impelled by the motor; these breaks can be made from ten to five thousand per minute, giving slow hammerlike vibrations, more and more rapid, till they are like the singing of insects or rushing of wind; the intensity of the sound can be modified by uncovering the helix, or the variety by changing the coils of fine or coarse wire.

The organ, as adapted to produce aural massage, consists of an ordinary desk-like case, containing the bellows, chest, valves, reed space, etc. In place of keys a "traveler" of wood passes from end to end of the case, held in place by strips forming a runway; the "traveler" is perforated, and the reed cells are perforated just above the free end of the reed, so that when the valve is opened by the traveler, the sound is conveyed to the auditory canal by an ordinary stethoscope. The traveler is fitted with an indicator, which shows the particular reed with which it is in relation, at any part of its course.

## LUPUS VULGARIS.

BY E. W. BRICKLEY, M. D., YORK, PA.

Fortunately for the average specialist in nasal and throat work, he is comparatively seldom (in this country at least) called upon to show his skill in the treatment of that serpiginous, scar-leaving inflammation of Hutchinson, commonly known as lupus.

The disease being more prevalent in Europe however, it was my privilege, during a year's residence in Vienna, to examine many cases in the clinics of Schrötter, Störch, and Chiari, which presented themselves for relief; but almost invariably the pathological process had begun its ravages upon the integument with secondary involvement of the mucous tissue; in fact, I remember but two cases in which the pharynx was the initial seat of the lesion. It is this involvement of the pharynx primarily which induces me to report the case lately under my care, particularly since a careful search through the rather scant literature on the subject reveals very few of the same nature as regarding the early manifestation of its presence.

Luc of Paris reports one; Seiler but three; my case, which he saw in consultation, making the fourth that had come under his notice.

Cohen also comments upon its rarity, as do most authorities, all seeming to agree in common that lupus almost invariably begins its inroads by attacking the more exposed portion of the integument, preferably the face.

Under these circumstances the *résumé* here offered may prove of interest to the readers of the journal.

On February 8, 1892, Mr. F. S., age thirty-three years, married and by occupation an expert chemist, presented himself at my office, suffering from what he termed "a chronic sore throat," which he stated was the result of an attack of "la grippe," contracted in the fall of 1890. His principal cause for complaint was an intolerable itching in the neighborhood of the posterior nares which caused him the greatest annoyance, often preventing sleep and occasioning him to resort to the use of solutions of cocaine, often as strong as twenty per cent., frequently applied with a brush for relief.

Pain in the ears was at times present, but was easily controlled by the cocaine.

This was his case, as he stated, there being nothing visible externally to aid in diagnosis.

Upon inspecting the anterior nares nothing abnormal was to be seen excepting a slight hypertrophic condition of the turbinates (inferior) on both sides, due to frequent attacks of coryza incident to recent exposures to which he had been subjected, but an examination of the pharynx disclosed an appalling state of affairs. The uvula was split into halves by a ragged angry looking ulcer, which extended to its base and seemed to threaten its total destruction.

On the posterior pillars were masses of indurated tissue the thickness of the little finger, together with ulcers in various stages of development or cicatrization. Several characteristic stellate cicatrices were in evidence on the post-pharyngeal wall, while a large ulceration was actively progressing in the direction of the left eustachian meatus.

The post-rhinoscopic mirror also revealed a large area of infiltrated and broken-down tissue in the pharyngeal vault, but no evidence of septal destruction.

The larynx was perfectly healthy; nor was there at any time during the progress of the case a tendency of the disease in this direction.

A careful inquiry into his habits and ancestry failed to reveal any specific or tubercular taint, and his health in every other respect was perfect, there not being the slightest evidence upon the skin anywhere of the throat trouble.

The marked induration, the peculiar cicatrices, the absence of fetor, etc., indicated a case of "lupus," and it was on this line that treatment was instituted.

The most dangerous looking spot seemed to be the uvula, and "curettng" being proposed, it was readily consented to in the hope that enough tissue might be saved to avoid regurgitation. A saturated solution of cocaine was used to anæsthetize the parts, a ten per cent. solution proving inefficient, owing doubtless to his continued use of the drug. The ulcer was thoroughly "curetted" into healthy tissue, after which the electro-cautery was applied to the raw surfaces. The other diseased spots were not operated upon at this sitting, as the patient seemed somewhat exhausted. The recuperative process progressed favorably here without a break, and up to this time there has been no tendency to a return of the trouble in this particular locality, but in the others we were not so fortunate.

During the time he was under treatment, he was subjected to at least a dozen (if not more) "curettings" of the pharyngeal pillars, and walls, before the process was thoroughly eradicated.

Lactic acid fifty per cent. was rubbed in the wounds after each operation, the electro-cautery seeming to increase the trouble here, rather than aid healing. The case progressed fairly well until August, 1893, when suddenly the left ala nasi showed signs of infection. The peculiar "apple jelly" follicle was plainly visible, and an ulceration the size of a dime on the mucous surface threatened to speedily mar a handsome countenance!

Hesitating to again subject him to operation unless absolutely compelled to do so, a twenty per cent. ointment of resorcin was ordered, which seemed to retard the disease, until the blustering weather of November caused a fresh outbreak and such exquisite suffering that it was decided to again resort to the "curette." This was thoroughly done under ether narcosis, the wound being dressed with sublimate gauze steeped in carbolized glymol.

A dressing of aristol was at first employed but seemed to increase the pain, so it was discarded for the other.

The recovery from this operation was rapid and so far seems to be complete, the patient at this writing enjoying excellent health; but being of course still under supervision.

It should be stated however that potass. iod.  $\frac{3}{4}$  j- $\frac{1}{2}$  j gtt. v. 2 t. d. was used internally for the past six months, and an occasional dose of gtt. iij is still being taken as a precaution against a possible relapse:

Hydrogen perox., iodine, creosote, resorcin, etc., were all used during the treatment, but nothing but "cold steel" seemed to have any pronounced effect.

## A NEW INSTRUMENT FOR THE COMPLETE EXAMINATION OF THE OCULAR MUSCLES.

BY HAROLD WILSON, M. D., DETROIT, MICH.

The constantly growing importance of the study of the disorders of the ocular muscles, and the necessity for their rapid and accurate determination, are my apologies for offering a new instrument to the profession.\*

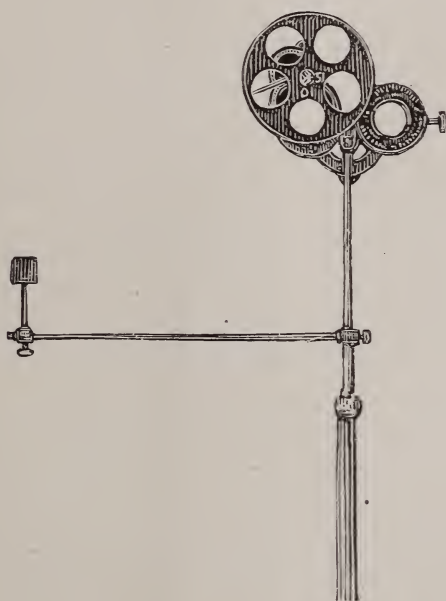
The phorometer, which is figured in the accompanying cut, is really more than a phorometer, as it measures not only the abnormal deviating tendencies of the eyes, but also their power of fusing double images in any plane. It might perhaps more properly be called an ophthalmomyometer. It consists of two cells, rotating in brass collars through an angle of  $90^{\circ}$ . In that before the patient's left eye is a pair of oppositely rotating  $5^{\circ}$  prisms, operated by a milled head conveniently placed. On the face of the right cell (left, in the cut), is a wheel carrying a double prism of  $6^{\circ}$ , a convex cylinder of 8 D., a prism of  $10^{\circ}$ , one of  $15^{\circ}$ , and an open space. On the other side of this cell is a red glass which may be swung to one side, and a clip for holding a supplementary prism. This cell rotates  $90^{\circ}$ , similarly to the left one. The two cells are hinged to a sliding upright rod connecting with a firm standard adapted for screwing the instrument upon the edge of the examining table. A flat arc of brass, containing a slot through which a set-screw passes, enables the examiner to adjust the instru-

\* The present instrument is a modification of, and improvement upon, that submitted to the section of Ophthalmology and Otology of the World's Homeopathic Medical Congress in June, 1893. See JOURNAL OF OPHTHALMOLOGY, OTOTOLOGY, AND LARYNGOLOGY, July, 1893.

ment perfectly level. By means of spring stops, appropriately placed when the instrument is leveled, the accurate adjustment of every part is assured and its findings may be relied upon as absolutely correct, within the ordinary limits of error in observation. A rod with a sliding object-carrier furnishes the means of making the various near-point tests.

With this phorometer the following observations may be made with great rapidity :

1. The equilibrium of the eyes with respect to the horizontal and vertical planes may be measured in any or all of



three ways: *a*, by means of two images, one fixed the other movable (as in the phorometer of Stenves); *b*, by means of three images, the two outer ones fixed, the middle one movable; *c*, by means of the line of light, as in using the Maddox rod.

2. The equilibrium of the eyes with respect to the oblique planes, *i. e.*, with respect to rotary motions of the eyes, may be measured by the method of Savage.

2. The power of adduction, abduction, right or left sursumduction.

4. If a resultant prism is to be used to correct a given degree of compound heterophoria, this phorometer will give at once its exact strength and axis.

In brief, the instrument is complete in itself for obtaining all the instrumental measurements necessary to a satisfactory knowledge of the condition of the ocular muscles in ordinary cases, and if unusual circumstances call for the measurement of heterophoria or muscular power greater than is provided for, a supplementary prism may be inserted in the clip upon the right-hand cell. One of the chief advantages of the instrument is, however, the fact that usually no accessory apparatus whatever is necessary. The instrument is, moreover, very compact, and may be carried in one's pocket or instrument-bag for the examination of patients at their homes or elsewhere. The fact that three methods of testing for heterophoria are available is a convenience of no small moment, as it is often desirable to check or verify the results of one method by those of another. A further advantage is the great saving in time which it renders possible, as one may make all the ordinary tests for equilibrium and muscular power in a minute or less, if such haste is ever desirable. I should be inclined to claim for it superiority over all other phorometers now before the profession, in the matter of completeness, convenience, and rapidity.\*

\* The writer will be pleased to answer any inquiries concerning the instrument, which may be addressed to him at 32 Adams Avenue, West Detroit, Mich.

## NASAL REFLEXES.

BY FRED D. LEWIS, M. D., BUFFALO, N. Y.

At the semi-annual meeting of this society I endeavored to demonstrate with a few cases the importance of investigating the origin of symptoms. The examples exhibited nerve, chest, menstrual, and general constitutional disturbance dependent on respiratory obstruction. The importance of discovering and removing the cause of the trouble complained of was strikingly brought to my notice by two recent cases, which I consider of sufficient importance to merit your consideration.

CASE I. Mr. S., age about fifty years, consulted me last fall; he presented a nose very much deformed, the result of a double fracture of some eighteen years' standing. The bone was broken and depressed between the orbits; also a second break extending downward, allowing the whole organ to incline at a considerable angle to the right. The right nostril was completely closed and the left very much reduced in caliber. He complained of frequent neuralgic pains on the right side of his face, and almost constant headache for a period of four or five years over the right eye. The headache was often so severe as to deprive him of sleep. These distressing symptoms might have been due to his occupation, which was that of a saloon keeper, but as his general health was excellent, and his habits were temperate, they would hardly allow of such a supposition. I advised an Adams operation. This he would not at once consent to but consulted another rhinologist, who suggested drilling out the nose, which might have afforded relief but would not have improved his appearance. A general surgeon next visited proposed cutting down to the bone, which should then be rebroken with mallet and

chisel. How he expected to keep the parts in position during the healing process I do not know. On January 16 he returned to me, saying that he was willing that I should now operate upon him. He was sent to the hospital, where the nose was thoroughly cleansed with a peroxide of hydrogen solution and he was placed under an anæsthetic. An attempt was then made to plug the post-nares, but was abandoned when it was discovered that a cannula could not be passed through the nose on account of the deformity. The Adams forceps were then inserted, one blade in each nostril, and forced up until they grasped the septum at the point of fracture, which was thoroughly refractured. A cork splint was now forced well up into each nostril and left *in situ* for three days. The splints were drilled to allow the discharge to escape, and also for cleansing purposes. On their removal they were replaced by one splint in the right nostril, which remained for but one day, to be succeeded with gauze packing. Sloughing of the bruised tissues now commenced, and all dressings were removed and parts washed several times daily with a solution of Sal-Lister; and in less than two weeks from the time of the operation new healthy tissue had formed over the injured parts and all discharge and odor had ceased. The patient had one slight headache the day after the operation, due to the anæsthetic. Since then, now over three weeks, he has been entirely free from neuralgic pain and headache; both nostrils are of use to him; his nose is almost straight, so nearly so that it would not attract attention. A small perforation of the septum has resulted from the bruising, but this will in no way bother him.

CASE II. Mrs. H. F., aged thirty-two years, was recommended to me from her physician, who suspected some nasal trouble. She told me she had been a sufferer from asthma ever since she could remember. She had frequent attacks of neuralgia on left side of face; left eye often painful and lids inflamed. Her digestion was much disturbed during an asthmatic attack, which was aggravated by damp or frosty weather. There was no unusual amount of discharge from the nose and she breathed equally well through either nostril. An examination brought to light a very much hypertrophied middle turbinated body which was in contact with the septum, with otherwise a comparatively normal condition. She objected to an operation, so an attempt was made to reduce the hypertrophy by deep cauterization of the anterior

end and lower surface of the mucous membrane covering the bone. This resulted in no improvement, and on January 3 she was induced to submit to the removal of a portion of the bone. The operation was performed with the cold snare, and a portion removed about the size of an ordinary white bean. Healing took place rapidly, and after a few visits to have the parts cleansed, the patient was not seen for a month. She then reported an improvement of her general health, her appetite and digestion much better, and she had in the meantime but two very slight attacks of asthma. These were probably due to some swelling of the tissues surrounding the operated surface, the result of irritation from cold or dust, or from the formation of a scab over the cut surface. Mrs. F. had taken numberless bottles and boxes of medicines prescribed by physicians, and remedies advertised as sure asthma cures, with no benefit, nor could any be expected so long as the source of trouble remained.

The aggravating symptoms in both of these cases were, to my mind, and I think proven by the results to be, pure reflexes due to pressure on nerve end-organs in the first instance by deformity, and in the second by an enlarged organ, and would have resisted the action of any medicines that might have been administered.

## REPORT ON THE OPHTHALMOPLEGIAS.

BY DR. H. ARMAIGNAC, BORDEAUX, FRANCE.

*(Continued from page 83).*

The localization of the primary affection is so uncertain that we cannot, even by the presence of the paralysis, conclude if the tumor is on the same side or on the opposite. Several observations by Nothnagel, Bull, Graefe, etc., demonstrate this difficulty in diagnosis. It will be wise, then, in a great number of cases, while admitting the basal origin of the paralysis, not to be too exact in stating the seat of the primary affection which produced it, as this affection may be very distant from the base of the cranium.

*Ætiology.*—The chief causes of basal paralyses are:  
1. Cerebral hemorrhages; however, these can be kept in view only when occurring at the base of the cranium.  
2. Pachymeningitis located at the base of the cranium. This is often the cause of recurrent paralyses of the common oculo-motor, and also of acute and curable double ophthalmoplegia.  
3. Meningitis of the convexity of the hemispheres. This would more likely produce an irritation of the cortical centers than a paralysis of the muscles of the eye. On the contrary, paralysis of the muscles of the eye plays a great rôle in a diagnosis of basal meningitis. In tubercular meningitis of children, for example, at the period of complete evolution, with contracture of the muscles of the eye, producing the most varied contortions of this organ, ocular paralyses do not follow, but, on the contrary, precede the disease. Consequently if we find in a child a paralysis of a muscle of the eye with consecutive diplopia this is most often a significant precursory sign of basal tubercular men-

ingitis, for rheumatismal paralysis is rare at this age. If the meningitis is circumscribed the paralysis may be cured. 4. Abscess of the base of the cranium proceeding from an otitis of the middle ear. 5. Dilatation of the vascular trunks (varices) of the base and of their branches. 6. Aneurisms of the internal carotid. 7. Obliterating arteritis in syphilitic affections of the arteries of the base. 8. Neoplasms of every variety, including gummata, acting mediately or directly by their presence at the side of the base. 9. Idiopathic affection of the nerve trunks of the base, neuritis, gummous lesions, tubercular meningitis, lymphomatous swelling, gray degeneration.

### III. FASCICULAR OPHTHALMOPLEGIAS.

Fascicular paralysis should be applied as much to the fasciculi which, arising from the cerebral cortex, pass to the nuclei of origin of the oculo-motors, as to those which, arising from these nuclei, pass to the base of the cranium to the point of emergence of the nerves. But the existence of the cortical not being demonstrated yet, it is difficult to study the first variety of paralysis.

It is not quite the same for the second kind. In the paragraph where I have given the anatomical description of the different oculo-motor nerves and of their intra-cerebral tract I have shown that the radicular fasciculi of the third, fourth, and sixth pairs traverse very important organs, in the midst of which they were confused with the structure of these parts, and of which a lesion would cause considerable and varied functional disorders, according to the region attacked and the extent of the lesion, but these functional troubles are rarely pathognomonic.

The study of the ophthalmoplegias of fascicular origin appears to me, then, so uncertain and hypothetical that I believe it is useless to speak of them other than to remind ourselves of their possibility. In certain ascending paralysees, consecutive to neuritis or to inferior polyencephalitis (progressive bulbar paralysis), one might perhaps note the moment when the degeneration penetrates into the cere-

bral tissue, but this study is yet to be made. However, if in the sequence of a simple ophthalmoplegia we observe bulbar phenomena the prognosis becomes grave.

#### IV. NUCLEAR OPHTHALMOPLEGIAS.

Of the different kinds of ophthalmoplegias that I have passed in review, or which still remain for study, the most interesting, beyond doubt, are those which have their origin in the nuclei of the oculo-motor nerves. Among these nuclei, those of the third pair demand the most attention. In fact, the nerves of the third and the fourth pairs only animate each a single muscle, and have only one nucleus of origin, the location of which is perfectly determined. The common oculo-motor, on the contrary, animates by itself alone six ocular muscles and a palpebral muscle. I would impress the fact that each of the seven branches has an actual origin in one of the cellular masses which together constitute the nucleus of the common oculo-motor.

Formerly we could distinguish orbital paralyses from intra-cranial paralyses, but one could scarcely go further; and it was with timidity that authors sometimes dared to hazard the diagnosis of intra-cerebral paralysis in certain cases where the paralyses were accompanied by other symptoms which permitted the admission of the existence of a focal lesion in the brain itself.

It was only in 1875 that one of our learned colleagues, M. Professeur Gayet of Lyons, made the first autopsy which permitted demonstration of lesion of the nuclei,\* but he could not explain the integrity of the internal muscles in such paralyses, because the anatomy of the nuclear region was still very imperfectly known from the discovery of Stilling in 1846. This author had described the nucleus of origin of the third pair, but only in the portion situated on each side of the aqueduct of Sylvius.

\* M. Gayet's patient was affected by polyuria, which aroused the suspicion of a lesion of the floor of the fourth ventricle.

The nuclei of the intrinsic muscles situated under the floor of the third ventricle were not yet known.

The works of Hensen and Voelckers,\* of Foerster,† of J. Hutchinson,‡ of M. Duval,§ of Parinaud,|| Kahler and Pick,¶ of Moebius,\*\* of Lichtherin,†† of Wernicke,‡‡ of Mauthner,§§ of Darkschewitsch,||| of A. Dufour,¶¶ have thrown new light on the pathogeny of central oculo-motor paralyses. I shall have occasion to return to this point, but I cannot pass without noting that the intracerebral origin of certain paralyses of the external muscles of the eye, with integrity of internal muscles, had already been suspected in 1868, that is to say six years before the first works of the authors whom I have cited, by A. von Graefe, who compared external ophthalmoplegia with labio-glosso-pharyngeal paralyses, but without suspecting its nuclear origin. This great clinician had already noted the two characteristics of the ocular disease; the integrity of the movements of the sphincter of the iris, of the ciliary muscle, and the slight participation of the elevator of the upper eyelid.

\* Hensen et Völckers, *Arch. f. Opht.*, 1878, T. xxiv. S. i.

† Förster, *Über combin. Augenmuskellähm, cerebral Ursprungs*, *Deutsch Med. Woch.*, 1878, No. 36.

‡ J. Hutchinson, Two cases of paral. of the ext. muscles of the eyes, *Lancet*, May, 1878: Sur un groupe de symptômes indicateurs d'une lésion du ganglion lenticulaire (ophtalmoplégie intrinsèque), *British Med. Journal*, août, 1878. The *Lancet*, February 15, 1870, vol. i. No. 7, p. 230.

§ M. Duval, *Journal de l'Anatomie et de la Physiologie*, 1880.

|| Parinaud, In Robin, *Thèse d'agrégation*, 1880.

¶ Kahler et Pick, *Zur localisat. partilier oculomotorinslähmungen Zeitschr.*, f. Heilk. Prag; 1881, T. ii. S. 301.

\*\* Möbius, *Neb einen Fall nuclearer Augenmuskellähmungen Central Bl. f. Nerven.*, 1882, T. v., S. 462.

†† Lichtherin, *Neb. nucleare Augenmuskellähmungen. Corn. Bl. f. Schw. Aerzle*, 1882, No. 1 et 2, p. 36.

‡‡ Wernicke, *Lehrbuch der gehirn Krankle.*, 1883, T. ii. et iii.

§§ Mauthner, *Die nicht nuclearen Lähmungen, Viertrage aus d. Angenheilk.*, 1889: *Die lehre von den Augenmuskellähm Vienne*, 1885-1889.

||| Darkschewitsch, *Neb. dem oberen Kern des n. oculomotorius*, *Arch. f. Anat. u. Physiol.*, 1889, 1 et 3.

¶¶ A. Dufour, *Les paralysies nucleaires des muscles des yeux*, *Annales d'oculistique*, mars-avril, 1890.

Hensen and Voelckers, in studying the small column of gray substance which represents the nucleus of the third and of the fourth pairs, recognized the existence of a certain number of small centers, each commanding a definite muscular group, and even discovered, in front of this column of gray substance, at the border of the third ventricle, new centers for the internal muscles of the eye. Foerster explained in this way the non-participation of these muscles in the paralysis when the nucleus lesion only involves a part of the common oculo-motor nucleus. Finally M. Parinaud demonstrated in 1880 that the varieties of ophthalmoplegia in which some muscles animated by the third pair remain intact were due to the integrity of certain portions of the nuclear region.

Since this period a large number of observations followed by autopsy have permitted confirmation in great part of the discoveries of the authors that I have cited already.

*Diagnosis and Symptomatology.*—Mauthner, from clinical observation, thinks that the nerves of the muscles of each eye have all their nuclei of origin from the corresponding side, and that total unilateral ophthalmoplegia is simply caused by a gradual affection of the nerve nuclei of the same side. We have seen that according to several eminent anatomists—Sappey, Muckel, and M. Duval, etc.—the right pathetic nerve has its nucleus of origin from the right side and *vice versa*. There should be then complete decussation of the radicular fibers and consequently of the nerves. It follows from this that destruction or alteration of the posterior part of the nucleus of the oculo-motor, to which is united the nucleus of the pathetic of the opposite side, should cause paralysis of one or several branches of the corresponding oculo-motor and of the pathetic of the opposed side. It is for the clinic to demonstrate if the facts are most often thus; now, in the observations published to the present time, I have sought in vain for a pathological demonstration of this anatomical disposition, denied also by several authors.

We have seen that the nuclei of the third pair form an

agglomeration of masses of gray substance contiguous with each other, overlapping, and situated on several planes of different height. It follows from this that the frontal section, from the posterior part of the nucleus to its anterior part, always meets several nuclei on each side of the median line, except however well forward, where we find only the anterior lateral nucleus. Since the various nuclei are overlapped on several planes we could not say that such or such transverse section of the bulb corresponds solely to a distinct nucleus.

By reason of this anatomical disposition it becomes difficult to determine experimentally the regions corresponding to the origin of such or such branch of the third pair, and due credit should be given to Hensen and Voelckers, and to Kahler and Pick, from whom we have learned the little we know.

In my opinion, outside of the clinic and autopsies, there is only one method which could elucidate in an easy and positive manner the origins of the various branches of the common oculo-motor; that is the method of Waller to which Gudden had already had recourse in 1883. By removing in as complete a manner as possible each of the muscles of the eye in young animals, it would be possible perhaps to demonstrate, later, an isolated atrophy of the nuclei of the nerves which animated them.

While waiting these experiments or others it is from anatomo-pathology that we expect explanations, and we already possess a number of autopsies sufficient to elucidate the approximate localization of the origins of the various branches of the common oculo-motor.

What is the order of the nuclei with relation to the different nerve branches of the third pair? According to Hensen and Voelckers the nuclei of origin of these different branches will be found one behind the other in the following manner, proceeding from before backward :

- 1st. Muscle of accommodation.
- 2d. Sphincter of the iris.
- 3d. Internal rectus muscle.

- 4th. Superior rectus muscle.
- 5th. Elevator muscle of the eyelid.
- 6th. Inferior rectus muscle.
- 7th. Inferior oblique muscle.

Superior oblique muscle.

This order may be correct, says Mauthner, but it is not probable ; this author, on the contrary, admits the schema of Kahler and Pick, as follows :

	1st. Ciliary Muscle.	
Median Side.	{	(a) Accommodator reflex.
		(b) Luminous reflex.
		5th. M. elevator of the eyelid.
		6th. M. r. superior.
		7th. M. obliq. inferior.
		M. obliq. superior.
		{ Lateral Side.

According to this schema, which is in better accord than that of Hensen and Voelckers with anatomo-pathological researches, the origins of the three synergic muscles are placed very near each other on the external lateral side of the nucleus, while the origins of the inferior rectus, which with the nucleus of the internal rectus forms the internal side of the posterior part of the nucleus, are near the superior oblique, which is a second depressor.

Let us see now if this order conforms to the progress of nuclear paralysis. What strikes us first is that in exterior ophthalmoplegia, well developed, the elevator of the eyelid is only rarely attacked. This peculiarity of the paralysis of the elevator is easily explained, says Mauthner, by the schema of Kahler and Pick, by admitting that the group of cells which constitute the nuclei of the ciliary muscle and the sphincter of the iris usually includes a part of the group of cells of the elevator situated immediately behind and outward from this region and belonging to the external muscles. Rarely in fact, this group does not comprise any cells of the levator, but in most other cases there exists a well defined interval between the group of anterior nuclei and that of the posterior nuclei. Besides this we know, from the researches of Heubner and of Divret, that the

arteries of the base of the brain do not anastomose, and that each of these groups is supplied, as we have already seen apropos of the anatomy of the nucleus of the third pair, by a special artery proceeding from a different trunk. This last anatomical peculiarity also explains why the two groups of nuclei can be separately attacked in consequence of an alteration of one or more of these arteries.

But the integrity of the interior musculature is not a characteristic symptom of nuclear paralysis. Let us admit, for example, a lesion of a nucleus belonging to the exterior muscles; then the ophthalmoplegia may persist such as it is, while the morbid process may extend forward or backward. In the first case it attacks the nucleus of the sphincter or only the relation that exists between the optic nerve and the common oculo-motor (pupillary reflex). The center for the ciliary muscle may likewise be attacked. In the second case the nuclei of the nerves of the seventh to the twelfth pair may be affected (Mauthner).

Consequently, being given a nuclear paralysis of the posterior group of the oculo-motor, one could conclude that the alteration extended forward if one saw follow in succession paralysis of the levator of the eyelid, then that of the sphincter of the iris and that of the accommodation.

On the contrary, if the nerves of the fourth pair and of the pairs following are attacked, one could conclude that the alteration burrowed along the aqueduct of Sylvius toward the fourth ventricle. If we add diabetes, as in Gayet's case, the diagnosis would be very nearly certain.

It is only in admitting a nuclear cause that we can explain the different forms of paralyses of the common oculo-motor, viz.: paralysis of this nerve with integrity of the iris and of the accommodation; with paralysis of the sphincter and integrity of the accommodation; and finally, paralysis of the third pair with unique absence of the pupillary reaction to light and integrity of the accommodative movements (Argyl-Robertson pupil) and of the accommodation; finally the paralysis of the oculo-motor which is

accompanied by contraction of the pupil, of which Wernicke and Fontan have reported some cases.

With regard to paralyses of the common oculo-motor with maximum dilatation of the pupil, the hypothesis of a basal cause is possible (Graefe), but the nuclear cause should not be excluded.

Counter to what is admitted by Wernicke, Mauthner says that the nuclear paralyses are not associated. The manner in which they are affected in both eyes follows no law; however the mode of onset of nuclear paralysis has something characteristic (the signs indicated by Benedikt): if one eye is already immobile one observes that the other follows with difficulty an indicated direction, sometimes even stopping its motion until resumed under the effect of a new nervous impulsion. Sometimes the movement is affected at a given moment and not at another; in the same day the movement may be more easy in the morning than in the evening.

In paralyses where the cause is seated along the nerve these differences are not observed, because the cause is permanent; while if the nerve cells are only altered and not destroyed, an effort of the will power may sometimes, especially after a night's rest, bring them into play.

Not only the total double paralyses, but also isolated paralyses of any muscle whatever may be of nuclear origin. The transient paralyses, little marked, easily disappearing, which precede tabes (Duchenne), disseminated sclerosis (Charcot), progressive paralysis (Graefe) are always of nuclear origin, although the morbid processes may be of diverse nature (Mauthner).

Paralysis of the interior muscles which usually attacks only the sphincter of accommodation without affecting the dilator may only be explained by a nuclear cause.

The isolated paralyses may sometimes be diagnosticated as having a nuclear cause because of the concomitant symptoms.

We have already seen that Gayet, in 1875, had made a very interesting diagnosis of this kind. The case was

that of a young man attacked by paralysis of the external rectus in whom, later, was found polyuria. Gayet diagnosed a nuclear alteration situated on the floor of the fourth ventricle; now, everyone knows from Claude Bernard that puncture of this region produces polyuria. For this reason, says Mauthner, one should examine the urine in every case of traumatism of the head with consecutive paralysis of the muscles of the eye.

Nuclear ophthalmoplegia is often preceded by cephalalgia which disappears at the same time that the paralysis sets in; however the latter may develop without any premonitory symptoms, and in quite an insidious manner.

We have already said that in paralysis of the third pair the integrity of the accommodation and of the sphincter of the iris pleads very strongly in favor of a nuclear origin, but if there is paralysis of the fourth or of the sixth pair, doubt is often permitted.

There is a variety of nuclear ophthalmoplegia to which Moebius has quite recently devoted an interesting article in the *Munchener medizinische Wochenschrift*, 1892, Nos. 2, 3, 4, under the title of "Infantile Nuclear Atrophy" (Neber Infantile Kernschwund). This author, reviewing the most prominent and the best demonstrated cases of ophthalmoplegia in children which have been published or which he himself has observed, says that the existence of an exterior ophthalmoplegia does not necessarily imply a nuclear origin, and that in admitting even the exclusive nuclear origin, this furnishes no information on the nature of the anatomical lesion.

In fact, primitive atrophy, inflammation, tumors, multiple sclerosis, poisons which do not leave visible trace—all these may, by acting on the nuclear region, produce exterior ophthalmoplegia. Moebius proposes to admit a single morbid entity clearly characterized: double exterior ophthalmoplegia, which develops slowly, which terminates in a stationary state, which is probably due to an atrophy of the nuclei, and which is not connected with other morbid conditions.

If one reviews the observations to which this definition may be applied, we see that this paralysis always occurs in youth, even in early infancy. It may also be congenital. Sometimes it attacks all the exterior muscles of both eyes, or only the two common oculo-motors, the two levators, or the two external recti. There exists no example of isolated bilateral paralysis of the pathetic. Sometimes the paralysis attacks only the oculo-motor nerves, sometimes it equally involves other cranial nerves, the facial more frequently than the others.

The author divides the infantile nuclear paralyses into several classes according to the muscles which are attacked. I do not comprehend, however, why he does not range under the same rubric of infantile ophthalmoplegia the monolateral paralyses that he describes plainly, but to which he applies the qualification of doubtful. For the same reasons that I have mentioned at the beginning of this work I see no difference between monolateral and bilateral paralyses, nuclear or not, except this, that in the former the nerves are attacked on only one side, whether at their origin or in the nerve trunk, while in the latter they are affected on both sides.

Moebius says that in all the cases of infantile paralysis of the cranial nerves that have been observed, he has always found the oculo-motor nerves involved. He does not deny that paralysis of the facial alone, or associated with other cranial nerves, of the hypoglossal or of any other nerve may exist, but he has found no example; the cases reported, those of Seeligmüller, for example, should be attributed to an application of the forceps, while those of Delprat appear associated with the development of an acute poliomyelitis on account of the suddenness of their onset.

The most complete form of paralysis of the muscles of the eye is evidently total exterior ophthalmoplegia, all other forms are only its rudiments.

In exterior infantile nuclear ophthalmoplegia, we cannot say that ptosis is never wanting. It is usually more or less pronounced. The depressor muscles of the eye on the

contrary are often intact. The same is true of the superior oblique. This circumstance, very favorable for the vision of the patient on account of the ptosis, indicates also that the nuclear lesion begins almost always in the rear of the first group of nuclei of the oculo-motor.

In double paralysis of the external rectus there present two cases impossible to explain; in the first case the two eyes remain habitually in the *primary position* and are directed straight forward. They cannot execute lateral movements, but the movements of convergence are possible although difficult.

Double paralysis of the common oculo-motor is rare, while double ptosis is relatively frequent.

In the normal state the movements of elevation of the upper eyelid and of the eyeball are synergic; thus their nuclei of origin are contiguous, and yet isolated paralysis of the superior rectus or of the levator is not impossible; for I have observed one case that I published twelve years ago in the *Revue clinique d'oculistique* (1882, p. 53).

In the same number of this journal I have also given the observation of a case of congenital mono-lateral paralysis of the superior rectus, with paresis of the levator and of all the palpebral and peri-orbital muscles innervated by the facial. All these muscles presented a considerable degree of atrophy. According to Moebius this case would be unique in medicine. It is not, however; for I have also had the occasion of observing another exactly similar, that I have published in the same journal in 1886.

According to Moebius, the facial paralysis which accompanies infantile nuclear atrophy has been seen only in double exterior ophthalmoplegia and bilateral paralysis of the external rectus. Never in this disease have been observed disturbances of sensibility or general symptoms, fever, vomiting, cephalalgia, etc.

To terminate the diagnosis of nuclear ophthalmoplegia I shall add that Mauthner affirms that all cases of exterior ophthalmoplegia, well characterized, are of nuclear origin. In support of his opinion he cites twenty-six observations,

of which three are personal and the others due to Graefe (1856-1868), Benedikt (1868), Schroeder (1872), A. Graefe (1875), Gayet (1875-1876), Canneset (1876), Rahelman (1878), Hutchinson (1879), Buzzard (1879-1882), Lichtheim (1882), Uthoff (1882), Rosenstein (1882), Warner (1882), Hock (1884).

Exterior ophthalmoplegia, he says, cannot be cortical, fascicular, or basal.

According to A. Dufour exterior ophthalmoplegia, however, should not be considered synonymous with nuclear ophthalmoplegia, for in some cases—rare, it is true—it may be of orbital origin.

*(To be continued.)*

## A NEW FORM OF ENUCLEATION SCISSORS.

BY F. G. RITCHIE, M. D., NEW YORK CITY.

"Of the making of books there is no end," and the same may be said of surgical instruments; but as there are good, bad, and indifferent, of one as well as the other, and as the *ne plus ultra* of improvement has not been reached, any struggle to reach that point, no matter how feeble and imperfect it may be, is commendable. This, then, is the only apology I have to offer for bringing to the attention of the profession a new instrument, in the shape of a pair of enucleation scissors, a cut of which follows.



The scissors are about  $4\frac{3}{4}$  inches long; strong, and light, and curved in such a manner as to facilitate their introduction, and prevent unnecessary mutilation of the capsule and tissues of the orbit. The cutting edges of both blades are deeply concaved near their points, so that when the nerve is once grasped by them it forces it backward between the blades and cuts it; while in the scissors ordinarily used, the tendency is to force the nerve from between the blades in the act of dividing it. Another point to be observed is in the construction of the upper blade, which is a millimeter thick, and beveled, at its cutting edge, thus forming a wedge which pushes it away from the sclerotic, cutting the nerve a short distance from its insertion.

The instrument is made by the well-known house of Geo. Tiemann & Co. of this city, who kindly furnished the above cut.

AN ABSTRACT OF THE TRANSACTIONS OF  
THE OPHTHALMOLOGICAL SOCIETY OF THE  
UNITED KINGDOM, SESSION OF 1892-93.

BY F. G. RITCHIE, M. D., NEW YORK CITY.

The Bowman Lecture, delivered by Mr. T. Pridgin Teale, is one that is of especial interest to us at this time, when so much is said and written for and against the subject selected by him as the title of his address—viz. "The Abandonment of Iridectomy in the Extraction of Hard Cataract"; and any light upon the *technique* of an operation which has produced brilliant results in the hands of any operator, and which, apparently, offers us advantages over existing methods, should not be dismissed without submitting it to the most critical and impartial investigation.

Mr. Teale introduces his subject with some personal reminiscences of the late Sir William Bowman, and pays high tribute to his skill as an operator, and to "the earnest scientific spirit in which he approached every question bearing upon his work."

It is difficult for us of the present day to conceive of the difficulties encountered, and the skill required, by the operators of the past generation. "Imagine, if you can, the surgeon making a large semilunar flap of the upper half of the cornea in a nervous patient with a sensitive conjunctiva and powerful orbicularis, with no speculum to steady the lids, no forceps to steady the eyeball, no cocaine to numb the conjunctiva and cornea, and no chloroform or ether as a general anæsthetic. Chloroform was then deemed unsafe on account of the risk of vomiting, and ether had not been

restored to British practice. Many a time did I assist Bowman in such extractions, and I cannot recall either a wound of the iris or loss of vitreous humor! . . . Keratonyxis, the slow process of absorption by needling, was the only method of dealing with soft cataract, requiring numerous operations and many weeks of time. Iridectomy was undiscovered, we knew nothing of hypermetropia, astigmatism was hardly dreamed of, test glasses were but a series of convex and concave spectacles in frames, and test types were strips cut out of books and newspapers pasted on a board!" Such was the condition of ophthalmic science (?) only forty years ago!

Mr. Teale considers the method of making the incision the principal point in the simple extraction. He says "in fact, the whole question of the abandonment of iridectomy seems to me to hang upon the exact incision that shall be selected." The incision which will presently be described he claims to have employed in a large majority of his cases during the past twenty years.

As an antiseptic he uses carbolic acid, washing the lids and lashes, and flushing out the *culs-de-sac* with a solution of three minims to the ounce of water, and also uses the same for his instruments, with the exception of the knife.

Cocaine is the anæsthetic employed, and this is prepared just previous to the operation, by adding ten minims of distilled water to a grain of sterilized cocaine, which is instilled into the eye once or twice.

A spring speculum is used, being given in charge of an assistant who holds it firmly with the thumb and finger, in order to protect the globe "from injurious pressure of spasm of the orbicularis."

He uses the broad-toothed fixation forceps, grasping the conjunctiva and sub-conjunctival tissue about three millimeters below the cornea.

The knife used is a modification of the Sichel, being of the same general pattern, except that it is narrower, approaching the Graefe, yet retaining the wedge principle of Sichel.

In making his incision he enters the point of the knife in the clear cornea "just within the outer margin at its equator," and makes his counter-puncture "just within the inner margin of the cornea at a level about two millimeters above the equator." After the point of the knife has emerged to the extent of about four millimeters, he rapidly turns the knife so that the blade, which up to this time had been parallel with the iris, is now turned at a right angle to the back of the cornea, and, the cutting edge being directed forward, he completes his incision by cutting directly out, the last cut being thus vertically through the cornea, absolutely linear, and situated midway between the horizontal diameter and the upper margin of the cornea. The moment of turning the knife from a plane parallel to the surface of the iris to that at right angles to it, he considers as the most critical of the operation. He says: "The knack of this part of the operation consists in so managing the knife, that, as soon as it is turned from a plane parallel with the iris, in which by its wedge shape it retains the aqueous humor, to a plane vertical to the back of the cornea, which at once allows the aqueous to escape, the edge of the knife should rapidly reach the posterior surface of the cornea and be in contact with it before the iris can fall over its edge. The incision thus made is practically a shallow flap, chiefly linear, with a small limb at an obtuse angle corresponding to the heel of the knife at the outer edge of the cornea, and a still smaller, hardly perceptible limb corresponding to the point of the knife at the inner edge of the cornea."

He then introduces the cystotome, without removing the speculum or loosening his hold of the conjunctiva with the fixation forceps, with which he makes pressure in order to steady the lens toward the cornea, and, after rupturing the capsule, applies pressure at the upper lip of the wound by means of the convex surface of the curette, until the lens engages in the incision and is gradually delivered by alternate or combined pressure of the curette and forceps. He then carefully removes, by the curette, any

remains of the cortical substance "so as to completely clean the anterior chamber and conjunctiva from all *débris*."

As a dressing, he employs vaseline smeared over the eyelids and lashes, over which powdered iodoform is dusted. A pad of absorbent cotton is then applied to each eye with an outer layer of black cotton, all of which are secured by a strapping of adhesive plaster. If there are no untoward symptoms the dressing is not removed until the eighth day, at which time he removes the pad from the unoperated eye, and changes the dressing of the operated eye.

He says "if we are to have improved results by the abandonment of iridectomy it will not be by returning to the old semilunar flap nor by incision at the corneo-scleral junction, *but by reducing the incision to as near the approach to linear extraction as the integrity of the iris and the bulk of the cataract will permit.*"

The following advantages are claimed for the incision : 1st. Inasmuch as it is a combination of both the flap and the linear, it possesses the advantage of removal of the lens without mutilation of the iris, and obviates to a great extent the liability to serious prolapse of the iris, and displacement of the flap by the upper lid. 2d. Owing to the fact that the incision is largely opposite the middle of the iris, and not at its periphery, the lens engages more readily, as there is less of the body of the iris to be displaced. 3d. As the greater portion of the wound is linear, and vertical to the thickness of the cornea, the wound closes absolutely, leaving a level surface which permits an early closure of the anterior chamber. 4th. The greater portion of the wound lying near the area of the pupil, it favors the escape of cortical substance. 5th. The incision being in the clear cornea and away from the ciliary region, there is less risk of subsequent iridocyclitis or glaucoma.

He reports 100 cases, 89 of which were made with the "shallow flap" without iridectomy. In 3 of these

there was loss of vitreous; in 2 the iris was grazed by the knife, while the remaining 84 were without accident. Of the 89 cases, 6 were failures: one in a drunkard; the second in a lady who had a hysterical attack two days after the operation; the third suffered from a wound of the iris; the fourth occurred in a gentleman eighty-four years of age, whose other eye had been lost after an operation combined with iridectomy; while the fifth and sixth failed without any obvious reason. He does not seem to be certain about the number of cases in which prolapse occurred. Glaucoma is recorded as occurring in one instance. Iridectomy was performed in 11 of the cases, after the extraction: for what reason he does not state. Of the remaining 72 cases, needling was resorted to in 14.

The paper loses much of its value from his failure to record the vision obtained after the operations.

The writer has used an incision during the past few years, that has yielded very good results in his hands. The knife used is a long, narrow, thin Graefe. The incision is made as follows: The point of the knife is entered just within the clear cornea, about one millimeter above its horizontal diameter, and its blade on a plane with the surface of the iris. It is carried across the anterior chamber and the counter-puncture is made at a point directly opposite. When the point of the knife has emerged, the knife is caused to rotate as it cuts its way out, thus making a "curvilinear" incision, the point of exit of the knife being about midway between the pupillary border of the iris and the upper margin of the cornea. Eserine 1-200 is instilled immediately after the operation, and on the afternoon of the day following, a drop of atropine is used to secure dilatation of the pupil and prevent adhesions to the capsule of the lens.

In speaking of discision of secondary cataracts, Mr. Teale calls attention to what he considers the chief risk attending the operation, namely, increased tension following the discision, which, if not checked, may result in an iridocyclitis or panophthalmitis. He cites a couple of

cases occurring in his practice, recently, by way of illustration. He says "In both instances I tore with needles the opaque posterior capsule: the one after an extraction of a traumatic cataract by suction, the other after an extraction of hard cataract by a shallow flap. Within forty-eight hours each patient suffered intense pain and dimness of vision from increased tension. On the third day in one case and on the fourth in the other I punctured with a broad needle through the upper part of the cornea and through the iris into the vitreous humor. The needle, turned sideways, allowed a few drops of the vitreous humor to escape. In a quarter of an hour, in each case, intense agony was converted into perfect ease. There was no relapse of pain or increased tension, and in a fortnight the subject of the extraction of hard cataract read J. 2." The method of treating such cases was communicated to him by Sir William Bowman.

Mr. A. W. Sanford reports a case of enlargement of both lachrymal glands, which attained the size of a large bean, causing closure of the palpebral apertures, and accompanied by enlargement of the lymphatics of the left temporal region and the parotid of the same side, the submaxillary glands, the tonsils, and the adenoid tissue of the pharynx. The patient was a farmer, age fifty-six, and otherwise appeared to be in fair health. There was no specific history. The lymphatic enlargements had existed for years, while the affection of the lachrymal glands was of but a year's duration. The tumors, together with the greater portion of the glands, were removed, and upon microscopic examination proved to be adenoma with a considerable proportion of small-cell proliferation. The operation was performed two years ago, since which time there has been no further trouble with the eyes, although the operation did not influence the size of the other glandular enlargements.

Mr. W. C. Rockliffe cites a case of panophthalmitis following an abscess of the lachrymal sac which was secondary to a caries of the nasal bones. The abscess was opened and

a poultice applied, which was followed by a profuse discharge and a decrease of the swelling of the lids. Three weeks after there was still some pus obtained by pressure over the sac, and the cornea was hazy. Three days afterward the lids became more inflamed, with chemosis and the appearance of hypopion, to relieve which a paracentesis was made. Two days later cornea began to slough and panophthalmitis followed.

The question naturally presents itself—was it good judgment to open the anterior chamber in the presence of a purulent dacryocystitis? I think not. But it may be argued that the eye would be lost anyway. Even granting that the chances of saving the eye were practically *nil*, still there was a bare chance, while, under the then existing circumstances, opening the anterior chamber meant almost certain destruction of the eye.

Speaking of hypopion keratitis, the writer would say that from personal observation he has yet to see the case of kerato-iritis with septic ulcer or abscess of the cornea that was ever benefited by a paracentesis. These cases occurring as they do in poorly nourished patients, or in those whose system is in a condition favorable to the reception of the micro-organism, do not present conditions favorable for healing, aside from the fact that the cut surfaces are exposed to danger of infection, and that the nutrition of the cornea is still further endangered by the operation. The galvano-cautery electrode (flat) heated to a cherry-red heat and lightly applied to the ulcer, or over the abscess, has yielded much better results when used in connection with the indicated remedy.

A case of conical cornea, decidedly interesting as far as the results obtained by operation are concerned, was reported by Mr. A. Quarry Silcock. The patient presented with a vision of  $\frac{20}{200}$  before the operation. An elliptical wedge-shaped piece was removed from the apex of the cone with a fine Graefe's knife, the long axis of the excised portion being at right angles to the meridian of highest refraction. This was performed on December 4, 1886. At the present time the vision is  $\frac{20}{20}$  with a  $-5$  D cylinder, axis  $65^\circ$ .

Mr. Adolph Bronner relates a case of membranous conjunctivitis occurring in a man forty-three years of age, in which the palpebral aperture was closed by a gray-white opaque membrane, adherent to the entire borders of the inner surfaces of both lids of the right eye. The eyeball itself was freely movable under the membrane. On puncturing the latter with a probe a quantity of yellow muco-purulent discharge was projected with considerable force into his face and eyes. He immediately washed his eyes with a solution of bichloride of mercury and suffered no inconvenience. After removing the membrane with the forceps a free hemorrhage followed. The ocular conjunctiva appeared red and swollen, and the cornea was hazy. Hot fomentations were applied, and cocaine and bichloride solution 1-5000 was used every half hour. The following morning witnessed a fresh formation of the membrane, which was removed. The next morning the same condition again presented with increased haziness of the cornea and signs of impending ulceration. He then resorted to the mitigated nitrate of silver stick, applying it to the inner surfaces of both lids, and was pleased to notice on the succeeding morning no re-formation of the membrane, although the haziness of the cornea had increased to some extent, and there was a large peripheral ulcer; as this increased steadily for five days, at the end of that time he applied the galvano-cautery to the ulcer, and in ten days' time it had completely healed, although the cornea still remained quite hazy, and there was well-marked pannus.

Mr. Simeon Snell reports two cases of *nævi*, one involving the semilunar fold, the other the upper and inner angle of the orbit and also the conjunctiva, commencing at the semilunar fold and extending directly outward to the cornea, thence above to the median line, and changing its direction, passed directly backward beneath the lid, and was lost deep within the orbit. They were both treated by applications of ethylate of sodium made with a camel's hair pencil, the eye having been previously rendered insensible by cocaine. The applications were made at intervals

of about seven days, six applications being used in the first case and four in the second, with the result of almost complete disappearance. In the last case the ocular nævus alone was treated, but it resulted in a corresponding change in the deeper one. In using the drug care must be taken to use but very little, and confine its application strictly to the part affected, when no irritability of the eye will ensue.

Mr. Gustavus Hartridge and Mr. F. Richardson Cross, each report a case of double optic neuritis, following influenza, with the following ophthalmoscopic symptoms: Disks white, borders very indistinct and rather swollen; arteries diminished in size; veins tortuous, with white lines along some of the larger vessels; numerous white scattered patches in the macular region. Mr. Cross also reports two cases of atrophy of the nerve without any signs of a previously existing neuritis.

A case of sarcoma of the optic nerve occurring in a male twenty years of age was reported by Mr. W. C. Rockliffe. There was slowly increasing proptosis of the left eye for one year, with no impairment of the motility of the eye, no displacement of the center of rotation, and absence of all pain except occasional shooting pains over the left brow. Vision with  $+1\text{ D} = \frac{6}{18}$ ; reads J. 1. Tension normal, as well as the pupil; slight contraction of the peripheral field; retinal veins full, but no pulsation. There was no diplopia, chemosis, tenderness of the orbital ridge, enlarged glands, or growth to be detected. He deduces the following: "I think the symptoms of tumor of the optic nerve may be considered as slowly but progressively increasing proptosis and loss of vision, with absence of pain and constitutional derangements, the external appearances of the eye and fundus oculi being normal, with the exception of proptosis and dilated retinal veins, and possibly some atrophy of the O. N. and symptoms of posterior pressure on the globe. If the tumor springs from the sheath, the displacement will probably be forward, non-central, and movements limited; if from the nerve, central proptosis and free movement."

Mr. Simeon Snell contributes two additional cases of

recurrent third nerve paralysis associated with migraine to the number already reported. In both cases there was almost complete paralysis of the third nerve, although in one case the intrinsic muscles of the eye were but slightly affected. In this case there were two attacks, the interval between them being four years. The attacks were preceded by severe continuous pain in the right temple, accompanied by vomiting, which lasted for five days. The paralysis disappeared in about two months after each attack. In the other case the attacks occurred every four or five weeks, with gradual increase in severity and frequency, and showed a tendency to permanent paralysis of the muscles innervated by the third nerve. The pain was located in the left frontal region, accompanied by vomiting and darting pains in the eye, all of which symptoms preceded the affection of the muscles. In this case the sphincter pupillæ and the ciliary muscle were completely paralyzed. It has been noted in these cases of paralysis accompanying migraine, that the shorter the intervals the more quickly does the attack pass off, and also that there is no tendency for the other eye to become involved.

Mr. E. Treacher Collins reports an interesting case of congenital coloboma of the iris and lens outward with absolute glaucoma. The patient was a male, age thirty-nine, admitted to the Moorfields Hospital April 27, 1892. He presented the following history, which is taken from vol. x. and the present volume.

Thinks that he has never seen well with the right eye, but in 1879 he consulted a physician who painted both eyes for a year (with what, he does not say) at the end of which time they both seemed worse. In 1887 the right eye was much worse, and a year following the left commenced to fail, so that in a year's time he could not see to read a newspaper, except with the greatest difficulty. Since that time the vision has gradually grown worse. There was no pain, nor had there been, but he had observed halos about the lights, and had had mists. In following the occupation of bartender he drank from ten to fifteen ounces of liquor

daily, and had followed the occupation for seventeen years. There was no history of a blow or syphilis, nor did there exist any other congenital defect in the patient or in his family. When examined by Mr. Lang in 1889, the right eye diverged and had no perception of light: Tn+2: cornea clear, but overlapped by conjunctiva above and below; anterior chamber shallow; a large coloboma, directed horizontally outward involved a quarter of the iris; pupil widely dilated when not under the influence of eserine; lens notched opposite the coloboma, and brown pigment spots on its anterior capsule; optic nerve deeply cupped and atrophic, the retinal vessels very tortuous, and broken at the edge of the disk. The left eye had good movement, bare perception of light: Tn+1: anterior chamber shallow; pupil dilated, but reacted well to eserine, the Tn being reduced to Tn+. When he came under Mr. Collins' care he stated that the right eye had been very painful for the last ten days, so that he had been unable to get any sleep. During the year and a half preceding, the left eye had become quite blind. The right cornea was hazy, there was considerable ciliary congestion, and the tension was increased. The eye was removed the following day, and it was found on microscopic examination that opposite the coloboma of the iris the fibers of the ligamentum pectinatum were clearly defined, the walls of the canal of Schlem were pressed closely together, and that the ciliary body ended in a rounded knob, which was in contact with the cornea. The termination of the knob, however, did not reach as far as the end of Descemet's membrane, so that the whole of the posterior surface of the ligamentum pectinatum was not blocked by it. On the back of this termination of the ciliary body were two layers of uveal pigment, and at the point where these ended, on the posterior surface of the ligamentum pectinatum, was a little accumulation of fibers and cells. The ciliary muscle, on the side of the coloboma, was very thin; the ciliary processes small, and in the center of the coloboma the anterior ones slanted at a very acute angle backward, while on either side they preserved their usual direction.

Mr. Collins, in speaking of the interesting features of the case, says of the unusual situation of the coloboma, "It is frequently—and I think, wrongly—assumed that a congenital deficiency of the iris must necessarily bear some relation to the ocular cleft. . . . It seems likely that the whole iris may be arrested in its development by some abnormal adhesion or late separation of the cornea and lens. If this abnormal adhesion or late separation existed in one particular part only of the surface of the lens, then it would be possible for the iris to develop in the normal way everywhere except opposite the adhesion, and a localized congenital deficiency would be produced." In substantiation of this theory of the production of the coloboma, he calls attention to the direction of the ciliary processes at this situation, which is accounted for by their lack of support due to some defect in the development of the suspensory ligament at that point, also the fact that, owing to the arrangement of the ciliary processes, with the layer of unpigmented cells behind it, it had never become separated from the cornea. This latter theory also accounts for the existence of the glaucoma, inasmuch as, owing to the relations of the parts, it had always presented an obstacle to the exit of the fluids at this point, and that the onset of the glaucoma was determined by the periphery of the iris in the rest of its circumference becoming pushed forward.

Mr. W. Adams Frost reported a case of microphthalmos of the right eye with a coloboma of the iris, on the temporal side, involving one-eighth of its circumference, and a coloboma of the choroid in the same location, extending in a peripheral direction toward the macular region, but which it did not invade.

Mr. A. Sanford Morton related two cases of hereditary congenital hemeralopia without visible changes in the fundus, occurring in two branches of the same family (an uncle and nephew), associated with which condition was myopia, marked contraction of the fields of vision, but no color-blindness. Inquiry revealed the fact that, in five generations, this condition occurred in fifteen members, all

of whom were males and had light hair. No female members of the family were thus affected.

Mr. Donald Gunn presented two cases of congenital ophthalmoplegia externa occurring in two brothers, in which there was incomplete ptosis with partial compensatory action of the occipito-frontalis muscle. The eyes were practically motionless, only a slight up-and-down movement being present. The pupils were active, accommodation normal, and there were no perverted muscular movements.

An interesting case of the passage of a leaden pellet completely through the eyeball with retention of perfect vision, was reported by Mr. Simeon Snell. It occurred in a youth of sixteen years. The shot entered at the inner side of the cornea of the right eye, piercing the coats of the eye, passing out again at the inner side of the optic disk. There was a small amount of vitreous lost, and although he was seen within two hours after the accident occurred, the hemorrhage into the interior of the globe interfered materially with ophthalmoscopic examination. The next day the eye had recovered its normal tension, and the vitreous had cleared sufficiently to enable him to discern a medium-sized hemorrhage in the situation of the optic papilla. He made an uninterrupted recovery, with the return of normal vision. Nine months after the accident he read J. 1, and the vision was  $\frac{5}{6}$ . Ophthalmoscopic examination at this time revealed a large whitish area, with pigmented borders, corresponding to the wound in the sclerotic, and extending from the periphery to within about three disks' diameters of the optic papilla. There was also a small, irregularly pigmented patch situated a short distance from the disk on its inner side, over which coursed an artery. The field of vision showed a defect corresponding to the point of entrance of the shot, while the place of exit merely rendered the blind spot somewhat larger.

In an examination of "the optical conditions existing in fifty apparently normal people" by Mr. H. Work Dodd, it was found that the average interpupillary distance was 6.012 cm.; the average punctum remotum of convergence,

1.24 m a; the average punctum proximum of convergence, 10.86 cm.; the average amplitude of convergence, 11.08 m a.

The average punctum proximum of accommodation was O. D. 10.10. cm.; O. S. 10.38 cm.; the average amplitude of accommodation, O. D. 12.53 cm., O. S. 12.20 cm.

The choice of the eye with which they more particularly looked at an object (which he has termed *oculation*) was the right in 34 cases, the left in 15 cases, while in 1 case it was indifferent.

He also found that the amplitude of accommodation was greater in the right eye in 28 cases; in the left in 17 cases; and equal in both in 5 cases.

Dr. Chassaud conducted an extensive series of experiments upon rabbits at the laboratory of the Royal College of Physicians at Edinburgh, in order to determine the relative value of different antiseptic solutions when injected into the vitreous. He used almost every conceivable antiseptic in solutions of different strengths. The only substance injected, after inoculation with fresh septic pus, which seemed to prevent the appearance of a purulent hyalitis, was chlorine water. This injection was tolerated by the retina and by the vitreous to a much greater extent than that of any of the other strong antiseptic solutions, and it gave rise to no retinal inflammation or to permanent vitreous coagulations. Mr. Berry, at whose suggestion the experiments were undertaken, used the injection of chlorine water in two cases of purulent hyalitis, and in both cases almost immediate improvement took place, and he was enabled to save the eyes, although the sight was lost before the treatment was begun.

Dr. Hill Griffith mentioned the trichloride of iodine as a salt possessing marked antiseptic powers and still unirritating, and one which, when brought in contact with organic matter, resolved itself into its constituent elements. The salt is stable, and according to Pflüger is used in a 1-2000 solution, in which strength it is fully as powerful as a 1-5000 solution of bichloride of mercury.

## BOOK REVIEWS.

A TEXT-BOOK OF DISEASES OF THE EAR AND ADJACENT ORGANS. By Dr. ADAM POLITZER, Imperial Royal Professor of Aural Therapeutics in the University of Vienna, Chief of the Imperial-Royal University Clinic for Diseases of the Ear in the General Hospital, Vienna. Translated into English from the third and revised German edition, by OSCAR DODD, M. D., Clinical Instructor in Diseases of the Eye and Ear, College of Physicians and Surgeons, Chicago. Edited by Sir WILLIAM DALBY, F. R. C. S., M. B., Consulting Aural Surgeon to St. George's Hospital, London. In one large octavo volume of 748 pages, with 330 original illustrations. Cloth, \$5.50.

It is superfluous to commend the work of the distinguished author of this treatise, which is generally acknowledged to be the standard and to contain the substance of all that is known in otology. The present edition contains the new matter necessary to bring the book up to date, and a number of additional illustrations. The press work and binding is beautifully done, and the result is a great improvement over former editions. This text-book is a necessity to every physician interested in the subject.

NEW TRUTHS IN OPHTHALMOLOGY. As developed by G. C. SAVAGE, M. D., Professor of Ophthalmology in the Medical Departments of the University of Nashville and Vanderbilt University. Thirty-two illustrations. Published by the author. Printed at the Publishing House of the M. E. Church South, Nashville, Tenn. 1893.

This little book of 152 pages is meat from cover to cover. There are few works in which so much new and valuable information is compressed in such a small space. We have followed Dr. Savage's work for some time, as it has been developed in his writings, and we have no hesitation in declaring that in our opinion he is one of the most original and accurate thinkers in the special line covered by most of his productions, viz., that of refraction and accommodation and anomalies of the ocular muscles.

The present volume takes up the relations of the oblique muscles to astigmatism; weakness of the obliques and how to correct it; the various methods of correcting all forms of muscular insufficiency covered by the term heterophoria, including indications for or against the advisability of operating, together with a description of several operations devised or improved by the author. There is also a chapter on the proper method of fitting glasses and the mode of determining the proportion of the total error to be corrected in the various departures from the normal muscular balance. The matter is new (in book form) and original, and the writer's style is so fresh, terse, and altogether interesting that to those engaged in this branch of practice it will be found much more readable than anything else on the subject, to say nothing of the fact that it is far in advance of all other works of its kind. No oculist can afford to be without the information to be found in its pages, and he is a well-read man who cannot learn something new from it.

THE BLIND AS SEEN THROUGH BLIND EYES. By MAURICE DE LA LIZERANNE; director of the "Valentine Haüy Conference," founder of the "Braille Library," editor of the *Braille Review* and of the *Valentine Haüy*, author of "Ten Years of Study and Work for the Blind," etc., etc. Authorized translation from the second French edition, by F. PARK LEWIS, M. D., Member of the Board of Trustees of the New York Institution for the Blind. G. P. Putnam's Sons, New York and London. The Knickerbocker Press, 1893.

We congratulate Dr. Lewis on the literary ability which he has displayed in the production of this most excellent piece of work. Those of us who are honored by being numbered among his friends, and who are acquainted with his attainments as a physician and an oculist, are fully warranted in expecting much from any undertaking of his, and it is sufficient praise to say that this translation is worthy of the man who made it.

The book, as the title would imply, is an analysis of the physical, intellectual, and moral qualities of the blind, written by one who—himself blind, and a teacher of the blind—thoroughly understands his subject. The text includes an outline of the life and work of Valentine Haüy, the philanthropist who invented raised letters and who spent his lifetime in educating the blind, and also a description of the point print in present use, and of the methods used in industrial, intellectual, and professional training

as practiced in the modern schools for the blind. The subject is ably treated, and the volume should be widely read.

**ANOMALIES OF REFRACTION AND OF THE MUSCLES OF THE EYE.**

By FLAVEL B. TIFFANY, M. D., Professor of Ophthalmology and Otology of the University Medical College of Kansas City, Mo., etc., etc. Author's edition. Kansas City, Mo.; Hudson-Kimberly Publishing Co. 1894.

This work of some 312 pages is intended as an introduction to the subjects treated of. The usual chapters on physical and physiological optics, and on the various anomalies of refraction, are given. The various methods of examining the muscular apparatus and the state of refraction are presented, and the treatment of the conditions constituting a departure from the normal is described. There is also a good chapter on the rules to be observed in the choice of spectacles, showing the necessity of properly centered lenses and well-fitting frames, with cuts illustrating the results of departures from these standards. The book is valuable in that it contains directions for using most of the new methods of examination and treatment, and cuts of much of the new machinery which has come to be necessary to the progressive oculist. The work is profusely illustrated, but the paper and printing could be improved upon.

**THE PHYSICIAN'S WIFE AND THE THINGS THAT PERTAIN TO HER LIFE.** By ELLEN M. FIREBAUGH. With portrait of author and 44 photo-engravings of original sketches. In one crown octavo volume of 200 pages. Extra cloth, \$1.25 net. Special Limited Edition, first 500 copies numbered, and printed in photogravure ink on extra-fine enameled paper; bound in half-leather and vellum cloth, \$3.00 net. Philadelphia: the F. A. Davis Co., Publishers, 1914 and 1916 Cherry Street.

This interesting little volume introduces to the reading public one of the physician's most valuable aids—his wife. To the country practitioner the story will serve only to recall many incidents in his own career, while his city brethren will be convinced, by the graphic portrayal of the vicissitudes of medical practice with rural surroundings, that they have some compensation for the "fresh country air" which they miss in their urban habitations.

The book is spicy and will hold the reader to the end. It is well gotten up and should be valuable to the country doctor, especially as a means of conveying much needed hints to some of his patients. To the wife of the city physician it should serve as a source of infinite contentment.

# THE JOURNAL OF OPHTHALMOLOGY, OTOLOGY AND LARYNGOLOGY.

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## DISEASES OF THE ACCESSORY SINUSES OF THE NOSE AND THEIR TREATMENT.

BY A. W. PALMER, M. D., NEW YORK.

We received our first knowledge of the treatment of these diseases from the pen of Meibomius, but there was very little exact knowledge of them previous to 1886, when Ziem of Dantzig drew attention to them. I think, however, that after understanding these diseases more thoroughly, we will not find them infrequent. Gradenigo of Turin, in 103 autopsies, found empyema of the antrum in eighteen per cent. Schäffer of Bremen remarks in the *Deutsche med. Woch.* that sphenoiditis "is not so rare as is believed," he having seen nineteen acute and fifty-three chronic cases.

Before taking up a study of the diseases of the accessory cavities, it may not be amiss to review some of the general regional anatomy of these sinuses, as they, being deep within the skull, and therefore difficult of access, are frequently passed over very meagerly in our anatomical studies.

Figure I, after Gray. Antero-posterior section of the skull through the center, showing septum composed of the perpendicular plate of the ethmoid above, and the vomer below. Let us now turn to cut one, figure II.,

which is a transverse section of skull made from a photograph taken from Ivins' work, "Diseases of the Nose and Throat." We look at it from behind, forward. Please notice that the floor of each antrum of Highmore is a little below that of the corresponding naris, averaging 3 mm. Again, notice the projection of the conical portion of the maxillary covering of one of the long roots of

Fig. 159.—Roof, Floor, and Outer Wall of Nasal Fossa.

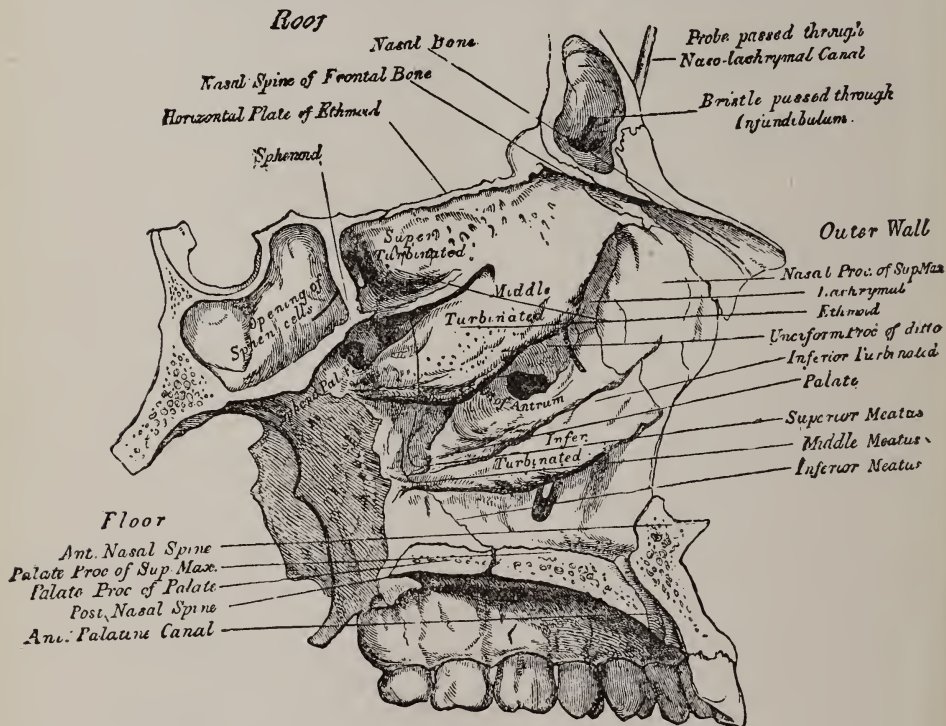


FIG. 1.

the second bicuspid tooth of the left side. The natural outlet of the antrum is so far above the floor, that you can see what poor drainage it affords. On the left side we see an infrequent anomaly, that of but two turbinateds, the lower edge of the left superior turbinated being connected to the body of the ethmoid, thus increasing the number and bulk of the anterior ethmoid cells.

If, now, we remove the septum seen in Figure I, we will have a view of the naris, as seen in Figure III.

We see above and to the right, the frontal sinus with the omnipresent "bristle passing through" the naso-frontal



FIG. 2.

canal and infundibulum—the drain pipe of the frontal sinus; above and in the center are the ethmoid cells; directly posterior to which is the sphenoid space. The



Key to Fig. 2.

posterior ethmoid cells, we will see empty into the sphenoid. The opening of the left half of the sphenoid sinus is into the left superior meatus (I). The pus in sup-  
puration of the posterior ethmoid and sphenoid sinuses

passes out through this opening above the superior turbinated and falls from this on to the middle turbinated, posteriorly, where it is recognized by posterior rhinoscopy.

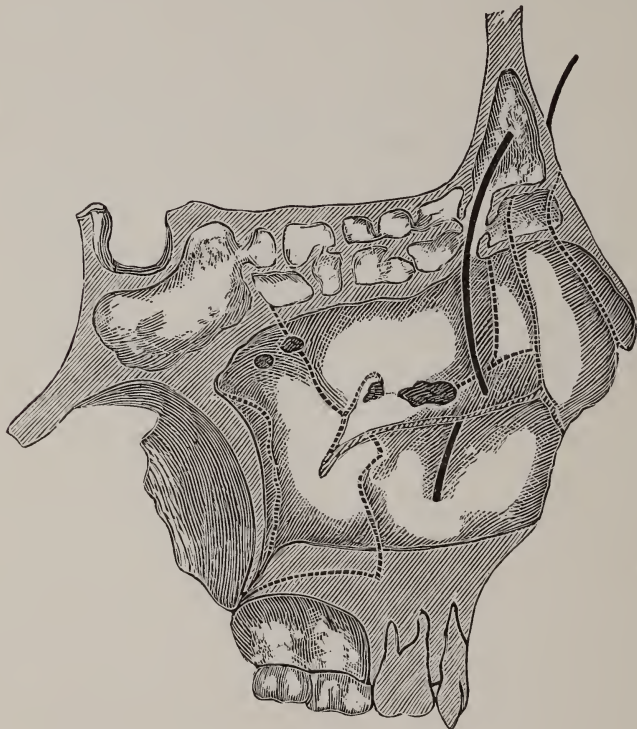


FIG. 3.

*Explanation.*—Parts shaded with parallel lines are sections of bone. The two heavy lines are quills passing through and indicating location of canals.

In these cases the superior turbinated is seldom seen on account of the swelling of the middle turbinated body.

Turning now to Fig. II., let us imagine that we make an antero-posterior section of the skull at about the middle of the ethmoidal cells above, and remove most of the turbinateds. The points to which I wish to call your attention are the following, viz.: about the middle of the lateral diameter of the anterior ethmoid cells is the naso-frontal canal, the outlet of the frontal and anterior ethmoid cells. The most

anterior of these cells are partially bounded above and in front by the frontal bone—in front by the upper portion of the nasal bone, and externally by the nasal process of the superior maxillary and lachrymal bones. These cells have an average width of from  $\frac{4}{16}$  to  $\frac{5}{16}$  of an inch. It is necessary to remember that the main portion of the external boundary is a thin plate of bone, the os planum of the ethmoid, which forms the internal wall of the orbit, therefore in close relation to vital structures. The average vertical diameter of the ethmoid cells is a scant  $\frac{1}{2}$  inch. The several cells of the ethmoid group are divided by delicate, uneven partitions; the various groups communicating with each other at irregular points, the anterior and posterior portions being bounded by thick and impervious walls.

The function of the accessory cavities is pneumatic in character, giving resonance to the voice.

*Diseases.*—As the accessory cavities are in close functional and anatomical relation, the diseases to which they are subject may be considered collectively to avoid waste of time and tautology. We except here the heading, "Diagnosis."

In each of these cavities occurs acute and chronic empyema or suppuration, caries, and polypi. In the ethmoidal and sphenoidal cells have been found both simple and syphilitic necroses. A French surgeon, Baratoux, reports a case in which almost the entire sphenoid sloughed off in one sequestrum. There are records of two cases of mycosis aspergillia of the antrum. Fink of Hamburg cites a case of fibro-myomata (polypi) of the antrum which, after operation, transformed or degenerated into a carcinoma (the particular classification not given). Dr. Bull, of this city, removed a myxosarcoma from the same cavity, and not long since I had the pleasure of seeing three cases of cancer in the same location. Foreign bodies *e. g.*, insects, larvæ, snuff, etc., may become lodged in any of the sinuses; but I find records of such occurring only in the maxillary and frontal; the same is true of exostoses.

Ethmoiditis posterior suppurativa and sphenoiditis suppurativa were first thoroughly described by Tornwaldt.

Catarrh of any of these nasal pockets is seldom mentioned as such ; but it doubtless accompanies every rhinitis catarrhalis, the catharral inflammation traveling along the mucosa lining the outlets to the pockets themselves. Catarrhal headache, an expression on the tongue of almost every New Yorker sometime during the winter, as we all know, is the pain caused by the damming up of the mucous secretions within the frontal sinuses, by stoppage of the naso-frontal canal, by the acute or transient swelling of the membrane lining it, in addition to that produced by pressure-contact of the swollen mucosa of the turbinal bodies and septum.

*Ætiology.*—Catarrh, and ultimately empyema, of *all* the cavities may be caused by: 1st. The occlusion of their respective outlets by swelling of the pituitary membrane in their immediate vicinity, from influenza or so-called cold—*la grippe*—polypi, polypoid degeneration of membrane, turbinated hypertrophy, and intra-nasal tumors. 2d. By extension of catarrhal or ozænatous inflammation. 3d. By infection, *e. g.*, exanthematous, erysipelatous, and syphilitic. 4th. By the presence of corpora adventitia within their walls.

Furst of Leipsig reports a case of empyema of ostium maxillari, found *post-mortem*, in a very young child, as a sequel of gonorrheal conjunctivitis.

Then, too, we have suppuration within the antrum of Highmore alone, consequent upon the following, viz.: periostitis, as a sequel of dental caries; suppurative degeneration of dentigerous cysts, owing to lack of development or eruption of teeth; mercurialism; epidemic furunculosis; traumatism and scorbutus; lastly, some ascribe as a cause, the drainage of nasal secretions into the ostium because its floor is below that of the naris. This I can scarcely understand, if no artificial opening has been made into it, because the outlet is located so high—it opening into the middle meatus. The other diseases, such as

polypi, cancer, etc., have the same ætiology, in this locality, as elsewhere in the body.

*Pathology.*—In my study of this subject I have been able to find so little literature upon its pathology that I will not consider it. Again, for the sake of brevity, we will combine

*Symptomatology and Diagnosis.*—Catarrh, polypi, poly-poid degeneration of the mucosa, exostoses, and cancer, all having the same symptoms of pain as empyema of the similar sinus, may ultimately cause suppuration. Cancer, of course, is accompanied by its customary cachexia. Mycosis aspergillia can only be diagnosticated by microscopical examination of the false membrane exfoliated. Necrosis and caries are recognized by the characteristic odor and the “surgeon’s finger or the end of his probe,” *à la* Helmuth.

In giving, fully, the symptoms of empyema of the several cavities in a diagnostic table, we will have the whole in a nutshell.

In explanation: instead of dividing the diseases into affections of the antrum, of the frontal cells, of the ethmoidal cells, and of the sphenoidal sinuses, they will be divided into: 1st, antral; 2d, frontal and anterior ethmoidal, and 3d, posterior ethmoidal and sphenoidal, because diseases of the frontal and anterior ethmoidal cells are almost always co-existent, on account of the former sinus communicating with the nares through the latter. The same conditions obtain in relation to the posterior ethmoidal and the sphenoidal cells, the latter communicating intimately with the former.

EMPYEMA OF ANTRUM OF HIGHMORE.	EMPYEMA OF ANTERIOR ETHMOIDAL AND FRONTAL CELLS.	EMPYEMA OF POSTERIOR ETHMOIDAL CELLS AND OF SPHENOIDAL SINUS.
<p>Headache, neuralgic in acute, and dull, heavy, boring in chronic; in infra-orbital region—occasionally absent in chronic cases.</p> <p>Presence of pus in all these cavities or in immediate vicinity of the Schneiderian membrane causes a peculiar thickened, bluish or purplish hue of the mucosa, <i>sui generis</i>.</p> <p>Pus-location:—On middle or posterior half of inferior turbinated, or in concavity of like portion of middle turbinated; appears more toward posterior portion, because inferior turbinated slopes downward and backward.</p> <p>Discharge augmented by patient taking Bayer's position; <i>i. e.</i>, bending head downward and forward between the knees.</p> <p>A profuse amount of discharge points to antrum.</p> <p>Upon transillumination, by placing light in buccal cavity and watching pupil, characteristic umbra.</p> <p>All have fetid odor of putrefying pus, more noticable to patient than to others.</p> <p>The classical symptom of swelling in maxillary region is usually conspicuous by its absence, except in very acute cases.</p> <p>In very acute cases skin of cheek turgescient.</p> <p>Eye protruded and forced upward, inducing diplopia.</p>	<p>Headache, neuralgic, or weight limited to supra-orbital region or radiating therefrom in immediate vicinity in frontal alone. When anterior ethmoidal cells are affected, pain is a little deeper in middle of head. Uneasiness, fullness, and usually pain or tenderness on pressure over supra-orbital region and nasal eminence.</p> <p>Aggravation from leaning forward, recumbent position, and damp weather.</p> <p>Ditto.</p> <p>Pus location:—Under anterior extremity of middle turbinated.</p> <p>Region of infundibulum and anterior extremity of middle turbinated covered with polypoid growths.</p> <p>Matter passes more easily while in upright position.</p> <p>Discharge more inspissated and crusty.</p> <p>Normal translucency of cheek.</p> <p>Ditto.</p> <p>Frequently a slight swelling, puffiness, and baggy feel of nasal eminence.</p> <p>Occasional reddening of integument overlying diseased space.</p> <p>Eye protruded downward and outward, caused by encroachment upon inner wall of orbit.</p>	<p>Pain very deep in head and very distressing, frequently radiating through whole side of face, involving all the branches of the trigeminus. Some refer pain to middle of head or base of brain; occasional oppression over the eyes.</p> <p>Vertigo.</p> <p>Ditto.</p> <p>Pus seen by rhinoscopic mirror, flowing off of superior turbinated on to and from posterior extremity of middle turbinated.</p> <p>Discharge freer in Bayer's position.</p> <p>Exclusion of pupillary umbra, but presence of pus on posterior extremity of middle turbinated.</p> <p>Ditto.</p> <p>Schäffer of Bremen notices a protrusion of anterior walls of sphenoid sinus, but I scarcely see how he recognizes such in so obscure a position.</p>

Link, of Lumburg, speaks of palpation of the hard palate as of assistance in diagnosing antral suppuration.

Rigors and fever, two constant symptoms of the suppurative process elsewhere, are here conspicuous by their absence, except in very acute cases.

Burger of Amsterdam considers that unilateral rhinitis very strongly "points to empyema of the opposite antrum," reasoning that with the patient lying upon the healthy side, the pus flows from the ostium, collecting in the healthy naris, causing said rhinitis.

In empyema of posterior ethmoids and sphenoid there is a certain amount of psychological depression. Dr. Moreau R. Brown of Chicago reports a case in which this even developed into suicidal mania, which latter disappeared in cure of sphenoidal trouble. Disturbances of vision may also present themselves with this disease, and Schäffer considers that, usually, the accompanying pharyngitis sicca, polypi, and tonsilar hypertrophy are caused by the empyema instead of *vice versa*. Further, as an aid to diagnosis as well as for conservative treatment, the antrum may be washed out with a mixture of hydrogen peroxide by means of the antral syringe or catheter, after shrinking the inferior and middle turbinateds by cocaine. If pus is present, we have abundant frothing. Some author, I forget now whom, claims to be able to pass a catheter through the naso-frontal canal into the frontal cells for the same purpose, after only cocainizing the surrounding tissues. I must remark, however, reasoning from observation upon the cadaver and my own experience, limited as any one observer's must necessarily be, the openings in question must have been enlarged by caries.

Lastly, we may resort to puncture of the several cavities, if it is positively necessary, but we agree with Dr. Moreau of Bordeaux in advising against such a procedure, because, as he says, it makes a path of ingress for microbes and foreign bodies, and, too, we dislike to attack normal tissue, if unnecessary. As these exploratory punctures are made similarly to the different operations, except with instruments of smaller caliber, the details will be found under "Surgical Treatment."

Usually, all these diseases may be differentiated from local neuralgias by the objective signs; and from rhinitis atrophica and caseosa by the more circumscribed location of the discharge in the former, and from ozæna by the fact that the very disagreeable odor is most noticed by the patient's friends, whereas in empyema it is most obnoxious to the patient himself.

Rhinoliths, corpora adventitia, and neoplasms may simulate diseases of the accessory cavities; but the surgeon (after thoroughly cocainizing the nares) can easily differentiate with a probe, assisted by anterior and posterior rhinoscopy.

In caries and necrosis we have also to depend upon our probe for assistance. The odors, too, are slightly different. Dr. C. E. Beebe says that when the purulent discharge in the nostrils is thick and caseous it is an invariable sign of implication of osseous tissue.

Uncomplicated polypus of the antrum may be diagnosed from empyema, by its causing no pupillary shadow, because of the refraction of light by its surfaces.

Suppuration of the frontal sinus must also be differentiated from: 1st. Distention of the lachrymal sac. In the former the tumor is usually higher, is harder or more resilient, and fixed; in the latter the swelling is softer and more mobile. 2d. Dermoid or sebaceous cysts which are very movable. 3d. Angiomata of the orbit, which increase in size on crying or heavy bodily exertion, and are also more mobile. 4th. Exostoses, sarcomata, and carcinomata may be separated by the absence of intra-nasal discharge of pus. The exostosis would be harder, because when empyema has proceeded sufficiently to encroach on the orbit, the surrounding lamella of the frontal bone is diseased and softened.

At this point allow me to digress one moment to mention to those interested in trans-illumination (the so-called Voltolini-Heryng method), that the most thorough article on this subject is "Electric Trans-illumination of the Bones of the Face," by Holger Mygind, M. D., of Copenhagen,

published in January, 1894, number of *The Journal of Laryngology, Rhinology, and Otology*.

I wish to urge caution in cleansing with hydrogen peroxide cavities containing pus and having but a very small outlet, because the action of the peroxide upon the pus causes the separation of constituents of the matter which deposit as small tenacious, stringy substances. Then if the outlet is much constricted this fibrous residuum is liable to be retained within the abscess cavity as an irritant.

*Sequelæ.*—In the available literature upon this subject, I have found only some fatal cases of meningitis and abscess of the brain mentioned as sequelæ.

*Treatment.*—Finally we come to the subject of treatment, the last and most important. Here, as in the greater majority of other maladies, we have the advantage of our *confrères* of the opposite school, by being able to give internal or constitutional medication according to the Hahnemannian law to control the progress of the suppuration or to hasten the reparative process after the active suppuration has ceased. I believe, consequently, that we cure our cases with less extended operations than they find necessary. As I can find but few cases of these diseases reported by homeopathic surgeons, we have no opportunity for comparison. And yet, conversely, we must not depend too much upon our internal medication and allow our conservatism to overbalance our more rational judgment, and simply cleanse the most accessible portions or outlets of these cavities. This latter seems to me similar to endeavoring to rid one's self of the shade of a tree by clipping the leaves and not striking at the roots. In collections of pus elsewhere we always give it free vent, and in these localities it is just as necessary, especially when the ethmoid or sphenoid bones are attacked; on account of the ease with which the pus can pass through the numerous small foramina in the cribriform plate of the ethmoid, or eat through the thin walls of the sphenoid, causing, as mentioned above, fatal meningitis or cerebral abscess. Therefore we strongly advocate free drainage.

To this explanatory preface let me add that in regard to the internal treatment, we prescribe symptomatically, as in any other case of suppuration, caries, etc., so that a detailed consideration of the homeopathic treatment seems superfluous at this time. It is in regard to the surgical treatment that I wish to speak at greater length.

*The Antrum of Highmore.*—There are three methods of operating upon this sinus, which take their respective names from the surgeons who first employed them: 1st. Jourdain's method; *i. e.*, puncture through the outer wall of the inferior meatus. 2d. Cooper's method; so called because Sir Astley Cooper first brought it into prominence, although it had been previously proposed by Drake, an English anatomist, in 1727: the ostium is opened through the cavity of an extracted tooth. 3d. Desault's method; or perforation through the canine fossa.

Jourdain's operation consists in puncturing the lower and internal wall of the antrum by an instrument introduced through the anterior portion of the outer wall of the inferior meatus at a point four millimeters above the floor of the naris and about four centimeters posterior to the nasal spine of the superior maxilla. This is preferred by such authorities as Lichnitz, Mowri, Mickulisz, and Loewenburg. Still it has its drawback in that the opening is not made at the most dependent part of the ostium, for the floor of the antrum is below that of the nose, therefore we do not have perfect drainage—the *sine qua non*.

Cooper, in his operation, drills a hole through the maxilla from the apex of the cavity of an extracted tooth, the last bicuspid or first molar is preferable because its root cavity is deepest, occasionally perforating the antral floor. An opening can be made with the common hand or electric drill, but Cohen's (of Philadelphia) drill is the best. An aperture in the bone eight or ten millimeters in diameter should be made, after applying a crystal of cocaine to the apex of the cavity; but even with this it is quite painful and hence often advisable to use ether or chloroform. Usually it is possible to find a decayed tooth, the loss of which will

be of little or no consequence; but occasionally this is not so and the extraction of a sound tooth is an objection, and with the opening in this locality the greatest care possible must be exercised to keep it properly plugged, otherwise some particles of food may find their way into the cavity, where they act as foreign bodies, creating irritation and inflammation. Furthermore the same objection obtains to this as to the former operation, viz.: it does not penetrate the most dependent part of the cavity; because we have noticed in the anatomy, that frequently there are conical projections on the floor of the ostium corresponding to the deeper root cavities; therefore, after this operation there is difficulty in cleansing the gutters surrounding and below the level of the apices of these root cones, similar to that in washing out the sulcus of the bladder behind an enlarged prostate—this we all recognize.

*Desault's Method.*—In this the lip over the site of the canine fossa is retracted upward and outward. A small piece of buccal mucous membrane is removed by scalpel and forceps, and the bone being denuded, the opening is made with drill or trephine. This method is the best at present known—because it *does* open into the depending gutter-like portion of the ostium, above spoken of. In this situation, the opening being in a horizontal direction through the almost vertical portion of the alveolar process, and covered closely by the super-imposed cheek, it is much more difficult for the intruding morsel of food to find its way into the pyogenic cavity.

Another advantage of Desault's operation is that, if it be found necessary to enlarge the opening in order to remove polypi, etc., it can easily be done in this location. An aperture can be made sufficiently large for the introduction of the little finger for palpation, or for packing the sinus with iodoform gauze, which may sometimes be found necessary in very obstinate cases.

After all these operations, the aperture needs to be kept open by an obturator or stylet. The former is usually made of hard rubber or boxwood, the latter (generally used) of

metal, usually gold plated and with two small wire arms to clasp the adjoining tooth in order to retain tube in place. Metallic stylets are frequently painful, so that when Desault's operation is performed, a Myle's soft rubber antral stylet gives most satisfaction. The collar, or enlargement, at one end, is placed downward between the labial and gingival surfaces to keep it from slipping upward into the sinus.

Moreau prefers to puncture the outer wall of the nares with the galvano cautery because it is not as apt to fracture the bony partition.

Dr. G. W. Caldwell, in the *N. Y. Med. Jour.*, advocates Cooper's operation conjoined with Jourdain's in order the better to wash out the cavity.

*Anterior Ethmoidal and Frontal Sinuses*—In some few cases these cavities may be irrigated with catheter *per viam naturali*. We recommend that this procedure be first attempted, but, on account of the accompanying swelling of the surrounding soft tissues, this may be considered almost impracticable.

Upon these spaces there are two modes of surgical procedure: 1st. Enlarging the naso-frontal canal, and 2d. Trephining in the region of the nasal eminence of the frontal bone.

The former is by far the preferable, as there is not the least disfigurement, neither is there the necessity of administering ether. With the latter there is slight scarring and thorough anæsthesia is required. The former is performed as follows: After cocainizing the tissues, one-quarter inch of the anterior extremity of the middle turbinated is cut off with either Meyrowitz's alligator nasal scissors or a small pair of scissors curved on the flat. Now the infundibulum is exposed. After hemorrhage ceases it is the usual procedure to enlarge the natural passage with a small-sized curette with curved shank.

In operating with the curette you will see that on account of the cutting edge being toward you, or downward and forward, you do not cut or scrape away the bone

around the naso-frontal canal; but rather force a passage through by merely breaking off the delicate walls of the ethmoidal cells in the path of the desired opening. These may be broken further into the ethmoidal cavity than necessary wherever the cell wall will fracture easiest. This of course gives a canal with very irregular or roughened walls, which is particularly undesirable, as after operating it is necessary to flush these cavities with some antiseptic solution through a catheter, which may be held in some of the irregularities of the canal so formed.

Then, again, when practicing on the cadaver, in a *naris* much occluded by a deflected septum, I forced an opening through the *os planum* of the ethmoid into the orbit. This emergency, of course, needs to be strictly guarded against.

To avoid both of the above, I have devised a simple but effective instrument, manufactured by Tiemann & Co.

On account of the curve of the canula, and, using the little point on the projecting end of the olive shaped burr as a director, it is quite easy to follow the naso-frontal canal. In order to cleanse it, turn the set screw between the handle and bulb, when the latter may be removed from the shank and cable, and the latter, in turn, withdrawn from the canula.

Having had no experience with the external operation, I will make an extract from a paper by Mr. Mayo Collier, on, "The Surgical Treatment of the Frontal Sinuses," read before the British Laryngological and Rhinological Associations, December, 1892. "The patient being anæsthetized, preferably by chloroform, and the interval between the eyebrows being divested of any hairs, and made scrupulously clean, a note is to be made of the exact spot in the midline, on the level of the upper margin of the orbit. This for the purpose of the operation, may be termed the 'pin-point,' as it is the spot where the pin of the trephine is subsequently placed. An incision should be made exactly on the midline, commencing at the root of the nose, below the glabellum, and carried upward for about two inches.

In this incision everything is divided to the bone. There is no hemorrhage as a rule. Next, the pericranial covering is raised by an elevator, and retracted to each side by blunt hooks.

"Bone to the extent of a five-shilling piece will now have been exposed. A trephine, with a crown the size of a sixpence, or less, should now be so placed on the glabellum that the pin of the trephine enters the bone at the 'pin-spot.' The trephine is worked in the usual way, with caution, examining with a fine probe the depth of the incision after every few twists. As it is important to remove the button without laceration or opening the lining of the sinuses, great care must be observed during the last few twists of the trephine.

"The trephine does its work first below, and there is always some difficulty in removing the button, the bony septum or arch dividing the sinuses retaining it above. By careful manipulation with an elevator the button of bone is detached, leaving the mucous lining of the sinuses intact.

"One or both sinuses, according to circumstances, is next to be opened with forceps and scissors and examined. . . Above all things, an opening must be established with the nose, and a drainage tube inserted and maintained in position.

". . . The wound is to be accurately adjusted, the pericranium and pericranial aponeurosis, as well as the skin, being separately and accurately adjusted. The tube may project from the center of the wound for the first few days, for the purpose of irrigation, but subsequently may be shortened or dispensed with entirely.

"The method of treating the other and more common class of cases as illustrated by a protrusion and displacement of the eyeball is equally simple and satisfactory. Lawson, Hulke, and others have laid down the rules and steps of the operation with great exactitude. An incision parallel with the eyebrow at the most prominent part of the swelling, followed by the introduction of the finger into the

sinus and the evacuation of its contents, constitutes the first step of the operation. The next step is to find or make a communication with the nose and insert a drainage tube. This is best done by a stout probe or director thrust in the direction of the infundibulum till it appears in the nose. A firm but small drainage tube is next inserted and maintained in position for the purpose of irrigation and drainage. . . . "

I find another authority, Povloff, a Russian surgeon who decries the internal operation on account of its making a path through which the frontal disease may attack the ethmoidal cells. But as these diseases are almost always co-existent this objection rarely holds good.

The external operation will probably only be needed in cases of polypi, cancer, adventitious bodies, etc.

*Posterior Ethmoidal and Sphenoidal Sinuses.*—To operate on these cells, first cocaine the naris thoroughly throughout its full extent to obtain anæsthesia and to reduce the erectile tissue of the turbinated bodies. It is frequently necessary to reduce turbinated hypertrophy by a preliminary operation. The object is to puncture the lowest available point of the sphenoidal sinus. This is accomplished by a straight hand, or preferably, electric drill or trephine, introduced through the anterior naris, and held against the internal or median aspect of the middle turbinated, parallel with its inferior border, but four millimeters above the same. The instrument held in this position strikes the anterior portion of the vault of the pharynx, which corresponds to the shelving floor of the sphenoidal cell and passes through the bone at an angle of about 25 degrees. It penetrates about  $\frac{3}{16}$  inch of bone, and after just passing into the sinus or after having penetrated the bone to the above depth there is a lee-way of  $\frac{2}{16}$  or  $\frac{3}{16}$  inch before there is any fear of puncturing into the cerebral cavity.

Dr. Schäffer operates by making a small opening into the sphenoidal sinus with a spoon, then dilating it to the desired size.

Even taking into consideration the large number of abnormalities of the skeleton, we think that operation upon these cells is not as hazardous as is generally considered, provided great care be exercised.

After operating, the diseased cavity should be washed with some antiseptic solution every day for one or two weeks and then gradually decrease the frequency of the application. These irrigations can be best accomplished with the smallest sized soft rubber eustachian catheter, using the wire director for introduction, because the inflamed granulating tissue lining the outlets to these cavities is less irritated by this than by the usual metallic syringe nozzles made for this purpose.

Salt, boracic acid, carbolic acid, and pyoktanin are the usual antiseptics; the latter two are preferable.

Occasionally, in stubborn cases, it is necessary to insufflate with iodoform, aristol, etc., or even pack the cavity with antiseptic gauze such as iodoform gauze.

## A STUDY IN LIGHT AND REFRACTION—III.

BY W. U. REYNOLDS, M. D., O. ET A. CH., NEW YORK.

“The universe is measured by an eye.”

To those interested in this subject the following may not require an apology for its presentment, though much of it is ancient and relating somewhat to Sir Isaac Newton's famous lens.

Attention is called to the *automatic* division of the field into rays by a lens as shown in study No. 1, as an explanation of the famous colored rings of Sir Isaac Newton. The projection of the rays in circles of overlapping circles as shown in the diagram would produce the alternate rings of color and darkness.

The indigo being refracted to the center of each ray, and the rays in circles, would produce black or deep, dark color, and the other colors a mixture making white, etc.

A lens held with its edge against a mirror at an acute angle so that the image of a small object, as a candle flame, can be first received upon the lens and viewed in the mirror by reflection, will show a multiplication of the image. At a certain distance of the object there will be seven images, an increased distance will produce more.

On looking at a candle flame through a very small slit, it will be multiplied, and an increase in distance will increase the number of images. This division is evidently a property of a lens and eye, possibly kaleidoscopic.

Sir Isaac Newton's scale of colors did not run as a single spectrum for each side of the lens, but in a succession of irregular spectra from within outward. In his own

description: black, blue, white, yellow, red, violet, blue, green, yellow, red; purple, blue, green, yellow, red; green, red; greenish-blue, red; greenish-blue, pale red; greenish-blue, reddish-white. A very evident division into rays.

As already stated, the diagonals and parallels into which the action of refraction is divided, are proportional lines to which a very complex action is reduced.

The lens based upon them and only outlined in last study, is shown in Fig. 1 with the values of the parts calculated. When the length of focus is made the unit, as it was in determining the size of image and length of focus for different distances, there results a strange relationship between the parts and their squares.

The natural unit of a circle is one-sixth the radius and of these are taken one and a half. This is the index of glass, and amounts to one-quarter the radius or one-eighth the diameter of the inner circles. It measures the angle the diagonal makes with the central axis.

The radius being unity, the cube of this unit is half the length of a ray,  $\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6} = \frac{1}{216}$ . The radius being 600, its cube is 1,000,000, the area of end of a ray. ( $.001 \times .001$ ).

In the figure, A is the length of focus from optical center. B is the diagonal. C is the radius of curve of surface. L is the width of lens. O is the opening or double sine. D is the sine of the angle formed by the central axis and the diagonal. R is the radius of lens, half the width. V is half the thickness of lens. W the whole thickness. Y is the versed sine of the opening. X is the difference between V and Y. Z is the difference between R and D, and F is the tangent to the angle formed by the principal axis and the diagonal, the diagonal being used as a radius.

The calculations are also made with A in 600-parts, and also as a single part.

When A, is 600—we will call them thousandths of an inch to correspond with the scale of the parallax meter, and which also will be the actual size of the human eye according to good authority—the length of R, half the width of lens, comes within .8 of half the length of a ray of light, the

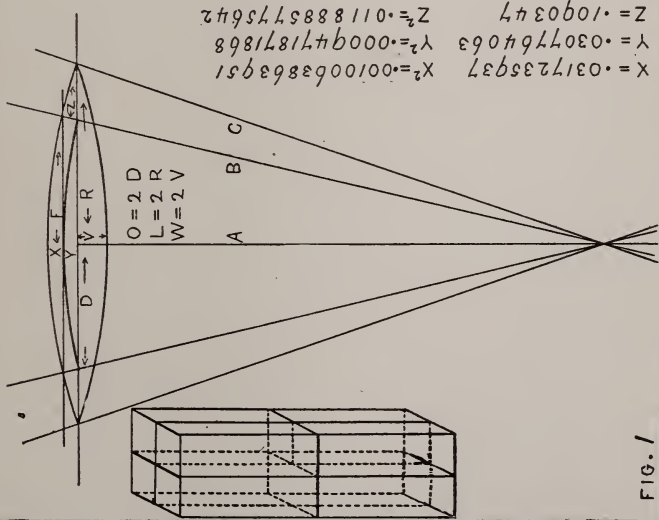


FIG. 1

A = 600.	A <sup>2</sup> = 360,000.
B = 618.4658438.	B <sup>2</sup> = 382,500.
C = 637.5	C <sup>2</sup> = 406,406.25
D = 150.	D <sup>2</sup> = 22,500.
O = 300.	O <sup>2</sup> = 90,000.
R' = 215.420867	R <sup>2</sup> = 46,406.25
L = 430.841734	L <sup>2</sup> = 185,625.
F = 154.61646095	F <sup>2</sup> = 23,906.25
V = 37.5	V <sup>2</sup> = 1,406.25
W = 75.	W <sup>2</sup> = 5,625.
X = 19.0341562	X <sup>2</sup> = 362.299102246
Y = 18.4658438	Y <sup>2</sup> = 340.987387246
Z = 65.42086	Z <sup>2</sup> = 4,279.8879231396

$$A^2 \times R = 775515.12.12$$

A = 1.	A <sup>2</sup> = 1.
B = 1.03077640+	B <sup>2</sup> = 1.0625
C = 1.0625	C <sup>2</sup> = 1.12890625
D = .25	D <sup>2</sup> = .0625
O = .5	O <sup>2</sup> = .25
R = .35903516+	R <sup>2</sup> = .12890625
L = .71807033+	L <sup>2</sup> = .515625
F = .2576941016+	F <sup>2</sup> = .06640625
V = .0625	V <sup>2</sup> = .00390625
W = .	W <sup>2</sup> = .015625

$$R^2 : D^2 :: 2.0625 : 1$$

sun's parallax, or yellow light, see study No. 1; and therefore with the addition of this difference would be half the square root of the length of a ray of sunlight of the diameter of lens' width.

We may say then the diameter of the lens corresponds to the width of one ray, when taken as a whole, the proportionate length being also twice that of one ray of half the diameter. Also we may say that, taking a cylinder of light of the diameter of the lens it would be composed of a multitude (about 63,000,000) of separate short rays each of an area of cross section corresponding to the square of one of the units of the focal length or to one six-hundredth of the principal focus, or to the .001 inch squared which would be the (.000001) one-millionth of a square inch. In a circle of the diameter of the lens there are 145,790 of these in the form of hexagons ( $L^2 \times .785398$  or area of a circle with a diameter of 1). If the hexagon has the same area as the square it would take the same number of them to fill the same space. We say hexagons considering them to be cylinders pressed together, and thus be all the same size and shape and fill the space without interstices.

When A is taken as unity the area is .405. A proportion of 1 to 2.469 or very nearly  $2\frac{1}{2}$ .

We will notice that  $R^2$  is 46,406.25, and on referring to tables of undulations of light, obtained by other means, we find it is the number that would come between those given as the number to the inch of the so-called undulations of yellow and yellowish-green light. Being 323 more than that calculated by Fresnel from interference phenomena for yellow light. His wave length for that color being 217 ten-millionths of an inch. It is hardly necessary to state that the results obtained by mechanical means closely agree with the tables.

The width of light used in the mechanical method is understood to have been three millimeters or one-tenth of two radii of our inner circle. If it could be said this would make one-tenth reduction in the width of a ray, then a

width of a ten-millionth of an inch would agree. Let our divisions be .0001 inch in length: its square cross section will be a hundred-millionth (.00000001) of a square inch, which will contain 100,000,000. just like it.

If our divisions were a ten-millionth long, A would be one ten-thousandth the focus of the eye.

The focus and wave lengths for the several kinds of light can be easily obtained with the aid of the proportions of this lens, from the table of lengths and numbers of waves made by Fresnel from interference phenomena. (See p. 186, Lardner's "Optics.") The proportions being the same as in this figure for all kinds of light, the focus being divided into a greater or less number of parts. The most refrangible light having the greater number but shorter single division. The more divisions made of a limited thing the smaller they must be.

Glasses of different colors placed before a lens do not appear to influence its action in the formation of a picture, the focus of the outlines not being changed, at least with the lenses and distances used. The colors red, blue, and yellow, and the screen close by, and the radiant distant. Also working the other way and placing a radiant that can be changed in area at about twenty inches from a twenty-inch lens, and a screen at about fifteen feet the other side of the lens, produced a picture upon the screen but with blurred outlines. On slightly moving the lens a place is found for it which makes the picture perfectly distinct but many times larger than the radiant, the lines connecting the edge of lens to edge of picture not being parallel.

Decreasing the size of radiant to many times less than the diameter of lens, the picture can be made to equal the lens in diameter.

For the above distance of screen the lens will have to be at a greater distance (22.5 inches) from the radiant than its focal length (20 inches).

\* When the outlines are clear, the interposition of colored glasses at the radiant does not change them, it only changes the color of the image.

Should the lens in Fig. 1, upon the lines of which the above action appears to move, have been made with a greater part of the focus than a quarter (a longer chord or greater angle of polarization), it would have been wider and thicker, and the number indicating the square of the radius of its diameter would have been larger. A less part of the focus would have made a narrower lens and a smaller square.

To make these greater and less numbers fit the same focus and width as would appear to occur when the colored glasses are used, the length of the individuals of the numbers must be, assumed at least, shorter in the first and longer in the second conditions.

But that lights of different refrangibility give the same focus for an object would be good proof that the image is a shadow or combination of shadows.

This inverse proportion appears in the table and explains why the wave length as there stated is shorter but more numerous for blue and longer and less numerous for red light. All having been reduced to the same standard length of focus or diameter.

We have spoken of yellowish light and will now take dark blue light.

In the table the number of undulations to the inch are 56,497. This, we will say, corresponds to  $R^2$  in the figure; divide it by the  $R^2 = .12890625$  and the quotient will be the square of the focus for that kind of light, namely 438,279. This inversely proportioned to  $A^2$  and  $R$ , as 438,279: 360,000:: 215.4: the length of wave. The means multiplied give us 77,551,512 and this divided by the extreme gives 177 as the wave length for dark blue light. Table says 177.

Take red light. Number of undulations 40,983. Divided by  $R^2$ , as above, gives 317,928 as the square of the focus for red light. Making the inverse proportion 317,928: 360,000:: 215.4: length of red wave. Multiplying and dividing as before, the result is 243.9. Table says 244.

The value of  $A$  for dark blue is 662, and of  $D$  is 165.5. For red  $A$  is 563.8 and  $D$  is 140.9.

Now, did the figures from the lens represent the ten-millionth of an inch, there would be a complete agreement with the table.

Is not the measurement of the velocity of light but the measurement of a circle and consequently also of a sphere?

We must not omit the consideration of the difference in certain respects between the light of the atmosphere and that from a radiant. The one an ocean in which the eye is immersed and moves about without approaching the source, while the smallest movement changes the relations to the other.

The atmosphere derives its illumination from the sun. The outer surface must be curved, taking the line of any stratum of density. Lines to the sun could not all have the same angle with a perpendicular to the surface, neither could they possibly have the same angle with a line joining the center of sun to the center of earth.

It is supposed the direct sunlight is like parallel light, but it is not; the focus of the sun's image is at a very marked distance from the lens' focus for parallel light or simple day or cloud light, the sun's focus being the longest.

There must certainly be a lenticular action in the atmospheric refraction unless crooked lines are the same as straight ones, and in estimating the velocity of light this influence should be considered.

It was noticed that when the earth in its orbit was farthest away from the planet Jupiter, the eclipse of the moons took place sixteen minutes later than when the earth was nearest to Jupiter. Upon these sixteen minutes and the 182 millions or more miles of diameter of the earth's orbit, the estimate is made of a velocity of 190,000 miles per second.

The refraction of the atmosphere is calculated as thirty-three minutes at the horizon; here there is more atmosphere to pass through and the distance to the eye-point on the surface of course is greater by half the earth's diameter. Can we say after the experiments with a lens, there is any place behind it where the influence of

refraction will not be felt? Would it not be more reasonable to imagine the refracted lines, taking both sides of a perpendicular, forming a cone shape, as they do behind a lens, and changing their inclination in proportion to the distance of the object, spreading when the object is coming closer and contracting when it is going farther away? Thus as the object recedes, the lines, too, move toward a central line, and as it comes nearer moving away from the central line, just as we have demonstrated is the case with a lens. The lines, then, when intercepted would be at a different point at a corresponding time, but not corresponding distance for the object, and when the first view of its advancing edge is had, this would happen sooner when the object is closer and later when it is farther away. Thus the earth being nearer to Jupiter the eclipses would occur sooner and being farther, the eclipses would occur later.

It is curious that the difference between the time of a good clock and the arrival of the sun at the meridian, is greatest when the earth is almost at its nearest point to the sun, the sun being ahead or faster than the clock; but especially that the greatest difference is  $16\frac{1}{4}$  minutes, a difference nearly identical with the difference between the eclipses of Jupiter's moons.

There is a peculiar phenomenon connected with the rising and setting of the sun, recorded from very ancient times; the sun suddenly jumps into sight or suddenly disappears. This is quite explainable upon the foregoing hypothesis, if we realize that it is not visible until it is thirty-three minutes above the horizon. A tangent from sun to earth would represent the line of vision without atmosphere, and the sun would be visible as soon as that tangent reached the eye. But the atmosphere bends it toward the perpendicular from center of earth to center of sun and the sun cannot be seen until the earth has rotated a distance equal to that between the foot of the tangent and the foot of its refracted line. When the latter reaches the eye the eye ascribes the position of the sun in accord-

ance with the direction of this refracted line, or to a much more elevated position than it really occupies, and it apparently jumps into sight. There is another illustration to show the bending of the rays toward a center line corresponding to the action of a prism and to the eye and blue glass experiment, in the natural spectrum of the sun. A small ray of sunlight throws a spectrum upon a floor for instance; if it is the morning sun, the blue will be toward the east; if it is the afternoon sun the blue will be toward the west. This I have watched myself. It is the same with the colors of morning and evening.

Light and direction must be in absolutely straight lines unless obstructed, and it is evident the measure of the velocity and vibrations of light are but the measure of refraction of a certain focus.

The hypothetical, we may say the actual, lens, is based upon the reflection and refraction of a single ray and a plane surface with a single perpendicular, first as an entirety. This combination is then moved outward to a certain distance and another combination placed at the same distance on the other side of the central axis, thus giving two combinations merged into a single one, taking the conditions as would appear on a single plane through the central axis. Innumerable planes are to exist at all angles radiating from the central axis. The polarizing angle for the central axis runs on a line through the optical center and through the extremities of the chord indicated by the intersections of the two circles (see Fig. 3, last study), of which the radii are equal. One circle has its center at the anterior principal focus and the other at the optical center. Upon this basis the chord will always pass through the center of outer circle and the circles can be increased to any size, but the same angle will always be indicated. To make a larger angle it is necessary for the center of outer circle to lie without the circumference of the circle about the optical center and have a longer radius which will produce a longer chord.

When two lines of equal length to it (chord) are run from

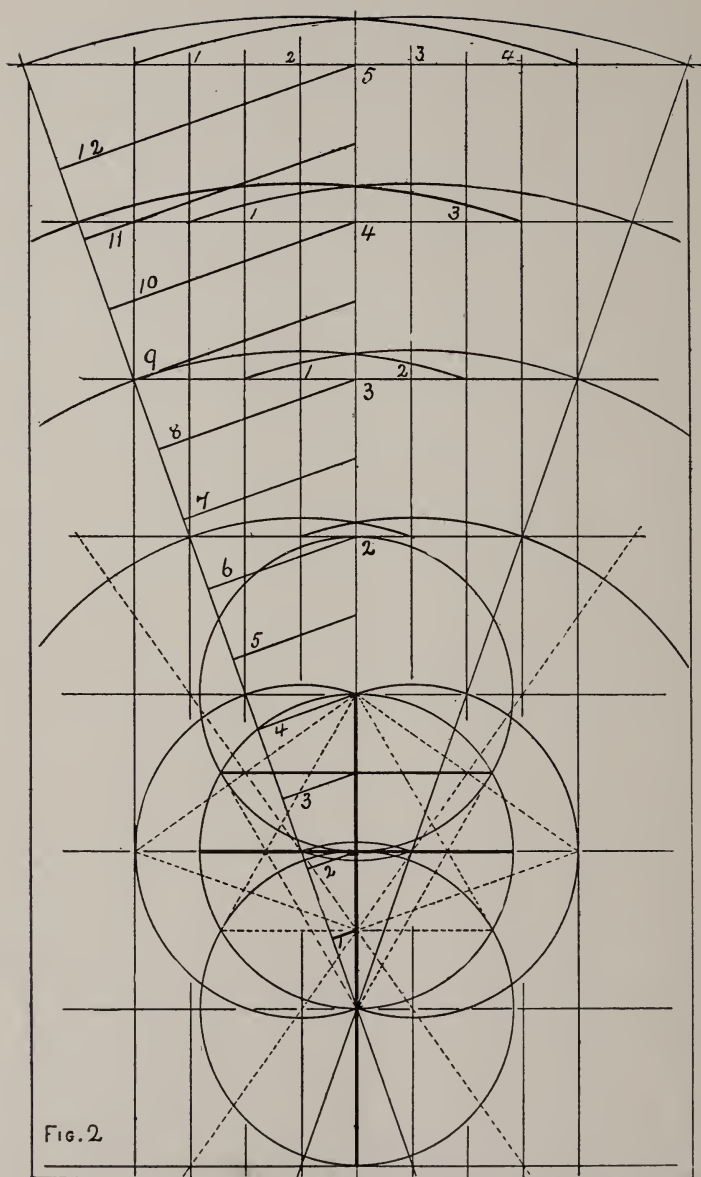


FIG. 2

its extremities downward toward the central axis, an equilateral triangle will be formed, the apex of which should be the posterior principal focus for that angle.

We will mark a point ("1" Fig. 2) halfway from optical center to posterior principal focus, then draw a line equal to the chord from anterior principal focus to a horizontal line through the optical center, and connect the junction and the marked point ("1"), doing the same with both sides. The original chord cuts the new ones at their centers. The lines connecting these centers with the marked point ("1") will cut the horizontal and enclose a space equal to the width of a lens (not the same as in Fig. 1), which space will extend between the centers of two solids to be described. The two lines when produced will cut a horizontal running through posterior principal focus and enclose a space equal to that on first horizontal. These two spaces enable the extension of two parallels to unknown distance. These two inclined lines (dotted lines), when extended anteriorly intersect a horizontal through anterior principal focus, enclosing a space equal to three times the width of the first parallel space. Twice plus one, the multiple the distance is of the length of principal focus.

Lines (solid) through edge of lens space and posterior principal focus will cut a horizontal at twice focal distance behind optical center so as to include the same width the first lines do at once the focal distance. The two sets thus enclose the same space, the width of the parallels, but at different distances from optical center. The first set appears to relate to diffused or daylight and the second to an object giving its own light, and the crossing point is halfway to optical center in each case.

*(To be continued.)*

## DIPHTHERIA UP TO DATE.

BY CHARLES E. TEETS, M. D.

Perhaps no more important subject could engage our attention.

Diphtheria is a disease by no means new. Attention to the literature of the past shows it to have been in existence from the most ancient times. Notwithstanding this, at the present time we do not find all authorities in medicine in harmony as to its ætiology and treatment. It is believed by most physicians to be due to a specific micro-organism, the Klebs-Loeffler bacillus.

The bacillus is supposed to have its origin in two ways: First, general infection (malignant form); in this the micrococcus diphtheria invades the whole system before its local deposits are perceived. Dr. Fenwick recently reported a case where, upon *post-mortem* examination, the stomach was entirely lined with diphtheritic membrane, extending into the pylorus one-third of an inch, without any evidence of such membrane either in the pharynx or esophagus. Second, localization (benign form). Here the disease remains local, owing either to early and proper treatment, or to the system being stronger than the diphtheritic poison and thereby overpowering it. In some cases the poison being more powerful than the economy, or the physician failing to recognize the disease in its early stage, it invades the system after first becoming localized.

Some authorities have considered it necessary to arrange diphtheria into two distinct divisions, both contagious. The first called pseudo-diphtheria, caused by various

microbes, and having a tendency to remain local, producing little systemic poisoning and comparatively free from sequelæ. The second, caused by the Klebs-Loeffler bacillus and much more malignant. The micro-organism here produces a malignantly poisonous ptomaine, which enters the circulation and invades the entire system, causing a profound intoxication.

The involvement of the general system is explained by the theory of the dissemination of a poison, called toxalbumin, which is generated by the bacilli during their propagation. However, cases of pseudo-diphtheria, if not recognized early and properly treated, may be transformed into the more malignant form.

From the observations which I have made, I am convinced that a large proportion of the cases in which there was systemic poisoning were, in the beginning, undoubtedly local and of the so-called pseudo form. In support of this observation, I may cite the investigations made by Klein and others who examined the faucial secretions of pseudo-diphtheria and found in a number of cases the Klebs-Loeffler bacillus, and in others a bacillus closely resembling it. Hence in the treatment of diphtheria, while not losing sight of the general condition of the patient, I make it a point to carefully watch the local manifestations.

While perhaps not yet absolutely *proven*, there is abundant testimony, clinical and otherwise, pointing to the identity of the two processes, diphtheria and croup.

Thus, examination of the membrane in croup has disclosed the presence of the bacillus of diphtheria which was discovered by Klebs in 1883; and, lately, minutely described by Loeffler. This is said to be found only in diphtheritic deposits; and it is reported that, in some of the large continental hospitals, cases of croup and diphtheria are placed in the same ward side by side. However, there seems to be at times a wide difference between the two diseases. The cough of itself, which when once heard, is diagnostic for a lifetime; and, more than that, the difficulty in the case of a child with croup seems to result

entirely from the presence of the membrane. Further, this membrane once removed, an apparently healthy surface remains; and with its removal pass away all the symptoms of which the child complained. In diphtheria you may get off the last patch and in twenty-four hours you may find new ones substituted for those removed. In diphtheria, a granulated surface is seen after the membrane's removal; in croup, a clean, apparently healthy surface is observed. Why then, if these two diseases are so distinct in their manifestations, do we ever regard them as one and the same disease? The reason for their being often mistaken for one and the same disease is, because though at their *extremes* they are so widely different, yet, *at times* they are so alike in all respects that they require a nice discrimination to decide between them. You may have the larynx invaded by a membrane, and, nevertheless, the evidence of diphtheria. This has been called by some diphtheritic croup; but, whenever the tendency to recurrence of the membrane exists, it is diphtheria and not croup. I do not believe there is a pathological condition which you can call diphtheritic croup.

A most important question for us to consider at this time is, How long should a diphtheria case be isolated? This is a matter of vital importance and one which is at the present time attracting the attention of very many of the authorities on diseases of the throat. One case is reported where the patient, supposed to have entirely recovered, made a visit to relations, ten days after his supposed recovery from the disease. One week after his arrival a child in the family was attacked with diphtheria, and died. An outbreak of diphtheria in a hotel followed the arrival of a person just recovering from the disease, and pronounced cured by the attending physician. There is also evidence of diphtheria being followed by the advent of a person who had just come from attendance on a fatal case. Dr. Robert Tooker\* reports a case he was called upon to attend, "which had all the appearance of a mild attack of follicular tonsillitis. There were, perhaps, half a dozen patches of

\**North American Journal of Homeopathy*, April, 1894.

exudate on the tonsils, which could easily be wiped off with a pledget. The patient made light of his illness and said he had had a similar sore throat scores of times before. Notwithstanding this, I cautioned him about caressing his six-year old son, of whom I noticed he was very fond. I treated the case a couple of days, when I dismissed him, and two days thereafter I met him, feeling as well as ever. In less than a week I was called to see this only child above mentioned, who suddenly developed a most malignant case of diphtheria, and died after an illness of five days." Thus we have evidence which goes to show that the poison is retained in the mucous membrane longer than is generally supposed.

In lieu of definite knowledge, would it not be well to advise quarantine precautions for one week after the patient appears to be perfectly free from the disease. This seems to be a fairly safe rule and one that is desirable, as isolation and disinfection are the surest means of controlling it.

I will not waste time in enumerating the different remedies which have been vaunted as specifics. A large number of remedies have been tried as solvents of the exudation; the chief ones being lactic acid, papoid, chlorate of potash, glycozone, and peroxide of hydrogen. The last mentioned is at present in the meridian of its glory. It may be that in the near future its sun will go down, as has been the ignoble fate of so many of its predecessors.

Dr. A. Jacobi states that peroxide of hydrogen is too irritating for local use in diphtheria. Dr. J. L. Smith considers that the irritating action of peroxide of hydrogen may be prevented by adding to it the sodium bicarbonate in sufficient quantity to neutralize its acidity as ascertained by litmus paper; by so doing its germicide and antiseptic properties do not appear to be lost.

To bring the treatment up to date, I have consulted physicians whose knowledge and long experience in the treatment of this disease ought to make their opinion worthy of consideration.

Dr. Schley informs me that the remedies he has found most frequently indicated are, apis, arum triphil., merc. cyan., kali bichrom., and that he favors local treatment in connection with the *indicated* remedy. As local applications he has used trypsin, papoid, and peroxide of hydrogen; giving his preference to the last named. He states he has had no reason in the last ten years to change his mode of treatment, and to the best of his recollection forty-five per cent. of the cases recovered. Many of these were seen in consultation and were severe.

Dr. T. F. Allen finds, in the early stages of the disease, apis and lachesis most frequently indicated, later mercurius cyan., bromine, rarely kali bichrom., etc. He considers local treatment of *all sorts* unscientific in theory, unsatisfactory in application, and eminently unsuccessful in results. He believes that fully ninety-five per cent. will recover under purely homeopathic treatment; and furthermore states that he has seen three out of four cases of diphtheritic laryngitis recover under internal medication alone.

Dr. Beebe of New York selects his remedy according to the stage of the disease. Thus, in the early stage he gives merc. prot., merc. cyan., iodide of arsenic, arsenate of quinine, and, occasionally, other remedies which seem to be better indicated. He never gives kali bichrom. in the early stage, but later finds it frequently indicated. In the infraglottic expression of the disease he has had excellent results from the use of pineapple juice and sugar, giving a teaspoonful every half hour in connection with the indicated remedy. In post-diphtheritic paralysis, phosphide of zinc he considers to be far superior to the remedies usually prescribed for this stage of the disease. Where there is no resistance on the part of the patient, he uses peroxide of hydrogen in solution by means of a spray, but rarely permits a patient to employ a gargle, as he believes absolute quiescence of mind and body on the part of the patient to be of the utmost importance. He uses the peroxide of hydrogen not only on account of its so-called solvent pro-

perties, but as a deoderizer ; and has frequently known it to destroy all odor after the first application. He does not believe that diphtheria is a local disease, but that the throat lesions are local manifestations of the constitutional infection. Under certain conditions there can be no question that in protracted cases a secondary blood-poisoning may take place from absorption of the localized disease products.

Dr. B. G. Clark finds the remedies most frequently indicated are apis, ars., arum triphyl., bapt., kali bichrom., lycop., phyto., puls., and rhus tox. The only local remedy he uses is a dilute alcohol ( $\frac{1}{2}$ ), or a little claret ; but would deem it safe to treat without local applications. He never uses local treatment in children that cannot gargle nicely, partly for fear of their swallowing some of the alcohol, as he believes that stimulants should be carefully avoided. To the best of his knowledge about ninety-five per cent., recover under the above treatment.

Dr. Deschere writes that the remedies he finds most frequently indicated are : Apis, bell., kali bichrom., merc. cyan., merc. prot., lycopo., lach., and sulph. ; but does not prescribe on account of diagnosing diphtheria, but strictly and absolutely following the entire condition of the patient under observation. He does not favor local treatment, except occasionally for cleansing purposes, using nothing but alcohol and water ; and further states that he has constantly grown firmer in his conviction that strict homeopathic treatment is the best in diphtheria. About ninety per cent., of the cases of diphtheria, diagnosed as such, beyond doubt, in his mind, recovered.

Dr. Ivins, in his book on "Diseases of the Nose and Throat," says : "There seems little doubt that mild local treatment is sometimes of great value. One point favoring the use of local treatment is the belief that the bacilli are present only in the most superficial part of the membrane." He further says, "Under homeopathic treatment the prognosis is not usually so bad ; yet, in certain epidemics death occurs in perhaps one-third of the cases."

When I commenced the practice of medicine I treated

cases of diphtheria with the indicated remedy alone. I did not, however, have the flattering results reported by my *confrères* who do not believe in local treatment. In 1886 I adopted the following treatment, which proved so successful that I have continued to use it ever since: The treatment consists in prescribing the indicated remedy, and the local application of turpentine and alcohol. The internal remedy to be given every half hour through the day and night. The local applications to be made every hour by means of a swab, atomizer, or, if the child is old enough, I have it used as a gargle. In very young children, or as soon as I am satisfied the larynx is involved, I employ steam, medicated with alcohol and turpentine. I sometimes use a steam atomizer, or erect a tent over the bed of the patient and carry the steam by means of a rubber hose to the tent.

Borrain\* recommends evaporations of essence of turpentine (150 to 500 gr. in twenty-four hours), and vaporization of water under a tent until the infant is cured. The turpentine is antiseptic, prevents extension of membrane to the bronchial ramifications, and ozonizes the diphtheritic intoxication.

W. A. Greet† reports the use of acetous vapor in one case as follows: One quart of malt-vinegar, placed in a steam kettle on fire, pouring a stream of vapor into the room; the child being covered by an umbrella to focus the steam.

All treatment must have in view two things: the removal of the essential cause of the disease, which is the specific ptomaine of the bacillus, or some poison unknown; and the elimination of the toxins absorbed by the system.

I believe, in its inception, diphtheria is a local disease. A symptom which I have verified a number of times, seems to favor this belief. In tonsillitis, the patient complains of much sore throat. In diphtheria, especially the malignant form, but little complaint will be rendered, the intensity of the poison tending to destroy sensibility. Furthermore,

\* *The International Medical Annual*, 1894.

† *British Medical Journal*, January 27, 1894.

in two cases which I had under treatment, and in which diphtheria was not suspected, upon examination I discovered hidden within the crypts small particles of a creamy colored membrane. Later this membrane increased in size, and prove to be diphtheritic and developed into a severe form of diphtheria. I am convinced that this early evidence of the disease would have escaped the notice of many physicians because, at the time, there were no other symptoms that would lead one to suspect diphtheria.

Ivins says: "It is not certain that particles of the diphtheritic virus may not remain dormant in the crypts of the tonsils, or in the nasal passages, to spring into activity when the system again presents susceptibility to disease."

Tooker,\* speaking of the conclusions of Wood and Formid says: "It is possible that the poison of diphtheria may cause an angina which will remain a purely local disease, no absorption occurring; or a simple local tracheitis, caused by exposure to cold, or some non-specific origin may produce the septic material, when absorption will result in blood poisoning, the case ending in a dynamic diphtheria. Thus we have some evidence, that not only favors the view that diphtheria is in its inception a local disease, but proves the value of local treatment."

The crypts of the tonsils form recesses for the incubation and subsequent germination of microbes. Where the tonsils are enlarged, such individuals are more liable to contract the disease when exposed to infection.

As a prophylaxis, I would advise the removal of the tonsils. While it will not insure complete immunity from diphtheria, it has not only been my experience but that of others, that where the tonsils were properly removed the patient rarely suffered another attack of diphtheria or from tonsillitis. My plan is to remove with the tonsillotome as much of the tonsil as possible, removing the remainder with the galvano-cautery. I sometimes dissect out the tonsil with the cautery knife alone as advocated by Pynchon, and which he calls "electro-cautery dissection."

\* *North American Journal of Homeopathy*, April, 1894.

## WHEN ARE GLASSES NECESSARY IN LOW DEGREES OF REFRACTIVE ERRORS?\*

BY DAVID A. STRICKLER, M. D., ST. PAUL, MINN.

This paper is meant mainly to draw from members of this section something of their individual experiences and practices in prescribing weak lenses.

The writer hopes to learn some method of treatment, if such there be known to any of you, whereby he may relieve more cases of asthenopia, headache, etc., without prescribing so many lenses of low degree.

When the refractive error is marked and the vision greatly improved by its correction I feel no hesitancy in subjecting the patient to the inconveniences of glasses, but when the error is slight and the vision little, if any, improved I long for some means to relieve the asthenopia and its consequences without subjecting the patient to the wearing of the much-dreaded glasses. It is with the hope that I may find others more successful in this line than I, and that I may learn of your ways and means, that I present this paper at this time and place.

In looking over the text-books one finds little bearing on the subject. In my own collection of between fifteen and twenty recognized authorities I find absolutely no reference to anything below 0.5 D<sup>c</sup>., and that mentioned only incidentally by De Schweinitz and Noyes. The latter says of astigmatism "even slight degrees 0.5 D., must not be neglected. But an error more than 1. D. should not in my opinion, be permitted to remain even in young subjects." In hypermetropia the same author says: "The con-

\* Read before American Institute Homeopathy, Denver, 1894.

vex glass which makes reading comfortable, whether 0.75 D. or 1. D. or 1.5 D., is all that they need." With these two exceptions I find no mention of anything under 1. D. either in spheres or cylinders save in their description of test lenses. The English and Germans especially show no disposition to prescribe glasses for low degrees of refractive errors.

In contrast with this I find in looking over my case books that I am more frequently prescribing the weaker lens, than the stronger, more frequently under than over 1. D.

Taking one hundred consecutive cases, exclusive of presbyopes, in the past year, together with the same number of consecutive cases from the previous year I find that of the four hundred eyes prescribed for. The following glasses were given :

ERROR.	LENS.	0.25 D.	0.5 D.	0.75 D.	1. D.	1. D.	TOTAL.	0.5 D. OR LESS.	1. D. OR LESS.	PER CENT.
H.	Sph.	7	21	13	8	21	70		49	70
Ah.	Cyl.	59	72	19	4	9	163	131		77
H. x Ah.	Sph.	15	23	10	1	20	69		49	71
	Cyl.	26	20	17	1	5	69	46		66
M.	Sph.	0	4	1	7	13	25		12	48
Am.	Cyl.	2	9	0	3	5	19	11		58
M. x AM.	Sph.	4	7	0	2	18	31		13	43
	Cyl.	6	7	3	1	14	31	13		43
Ahm.	Sph.	0	2	0	2	0	4	4		100
	Cyl.	0	0	0	0	4	4		4	100

From which it appears that 77 per cent. of the Ah. received 0.5 D. or less. That 58 per cent. of the Am. receive 0.5 D. or less.

That 70 per cent. of the H. received 1. D. or less.

That 48 per cent. of the M. received 1. D. or less.

That 66 $\frac{2}{3}$  per cent. of the H.+Ah. received cyls. 0.5 D. or less.

That 71 per cent. of the H.+Ah. received Sph. of 1. D. or less.

I confess that I am surprised at the above figures. I knew that prescribing lenses of low degree was a common occurrence with me, but I did not expect to find them bear such a large percentage to the whole number prescribed. I confess also that in some instances subsequent history proved some of these prescriptions to be unnecessary, but on the other hand many of the most remarkable and pleasing results I have ever seen from glasses came from 0.25 Dc. and 0.25, or 0.5 Ds. On the whole I am not sure that a weak sphere or a weak cylinder promptly and persistently selected by a patient does not offer as much promise of benefit as does a stronger glass. The question I would raise is not, "Are glasses ever necessary in low degree of refractive error," but rather: "Under what conditions may they be dispensed with when there is asthenopia associated with low degrees of refractive errors?"

I suppose all of us will agree that no glass should be prescribed for low degrees of refractive errors for one convalescing from typhoid fever or any other acute illness, but that instead rest, diet, etc., should be substituted. So, too, in run-down conditions from any cause, the general health should be carefully looked after, and all done that may be by way of systematic out-door exercise, bathing, careful attention to diet, etc., together with the indicated remedies.

In all these things there can be but one opinion. Unfortunately these measures have not sufficed in a large number of cases applying to me for relief. With me the question, "Is there not something further, short of glasses, that will relieve them?" like Banquo's ghost will not down.

Outside of treatment directed to the general condition of the patient and remedies prescribed for the general rather than special symptoms, my success in relieving these cases has not been phenomenal. One cause of this may be that a large percentage of the cases that come to me have been under the care of homeopathic physicians, and many of them had the advantage of prescriptions carefully made.

Natrum mur. in esophoria with a drawing stiff sensation in the muscles and other symptoms of asthenopia, when no general indications existed, has cured some cases that would

otherwise have received glasses. Ruta, when the ciliary muscle seems to be the chief source of asthenopia, has relieved many cases.

Paris quad. has relieved a few cases of marked asthenopia in which the symptom, "Pain in the eyes as if pulled into the head, or as if threads drew from the eye into the middle of the head" was present.

Phos. and zinc. phos. have served a good purpose in what may be termed retinal asthenopia or hyperæsthesia and irritability of the retina accompanied by photopsies, chromopsies, etc.

Jaborandi and physostigma in spasm of the ciliary muscle have also served me well. Beyond these remedies I have had little success in relieving asthenopia of any standing by giving remedies directed to conditions of the eye alone.

My method of procedure in all cases applying for the relief of asthenopia, headache, etc., is to first ascertain the state of refraction without a mydriatic. If the patient promptly selects a glass each time it is placed before the eye and selects the same glass promptly at three consecutive examinations, no mydriatic is used at all. If the refractive error is slight and the patient so situated that I can see him at my convenience I correct such habits as seem to need correction, and give such remedy as seems indicated, and have him call one, two, or three weeks later. If no better at this time and he again selects the same glass promptly as before I give him such further instructions and remedy as seem to me may be of benefit to him, but no mydriatic, and have him call in a week or two again for examination. If this third examination agrees in every respect with the former two, and the treatment has had little or no effect in relieving the suffering I prescribe the glass selected whether it be a 0.25 Dc. or a 0.5 Ds., never a 0.25 Ds., unless it improves the vision or gives a marked sense of relief to the patient.

If these glasses do not give relief, and there is nothing in the age of the patient or condition of the eye to contra-indicate, I use a mydriatic. Of the mydriatics I prefer atropine when time is no special object, homatropine when it

is. If on the other hand the patient accepts no glass, or hesitates in the selection of a glass, or selects glasses of different strength the same day or on the second examination, no benefit having resulted from treatment given, I then resort to a mydriatic.

When the case is not so completely under control it has to be treated differently, but I aim to carry out the same general line, prescribing weak lenses without mydriatics, when they are promptly and definitely selected, using a mydriatic in suitable cases when no definite selection can be made without, and of course give no glass when not definitely called for under a mydriatic.

I formerly used mydriatics very much more freely than I now do. I rarely have occasion to change a prescription when the glass is promptly and definitely selected by the patient at three or more consecutive sittings, and on the other hand I rarely am able to prescribe successfully without a mydriatic for a case that does not definitely select a glass.

Ophthalmoscopic examinations are carefully made in all cases, but except as an aid in the detection of ciliary spasm, and when used in retinoscopy, the ophthalmoscope is of little use in detecting slight errors of refraction. In all cases with an intelligent patient, and nearly all who really suffer from slight refractive errors are intelligent, I place my main reliance on the results with test lenses. I have had no experience with the ophthalmometer, but with its inherent defects I would expect little or no assistance from it in these cases.

Of course all cases are tested for heterophoria and in no case is its presence lost sight of. It is a constant source of gratification to me to see exophoria and esophoria either disappear or fail to give further discomfort in a very large percentage of cases where even weak spheres, cylinders, or sphero-cylinders are prescribed without further attention to the muscular trouble. Where the trouble remains I have had very good success with prismatic exercise and believe it the most rational treatment.

Hyperphoria more frequently requires surgical treatment.

I have prescribed prisms to wear in all forms of heterophoria, at times with the most marked benefit. I have also seen excellent results in exophoria from discarding spheres, but it is not my purpose to go into the question of heterophoria in detail.

While no hard and fast lines, by which all cases may be measured, can be laid down, no rules can be drawn that do not have their exceptions, because here, as elsewhere in medicine, each case is in some measure a law unto itself, yet I venture the following which materially aid me in deciding what to do in individual cases.

Among the cases of slight refractive errors that have seemed to me to demand glasses is that class that come with the complaint that they are near-sighted, and always have been. When given a book or paper to read they will hold it from six to ten inches from the eye and declare they cannot see it further away, while their distant vision is normal or practically so.

Examination reveals a slight error of refraction, in all my cases astigmatic in character, usually about 0.25 D. or at the outside 0.5 D. Cylinder placed either with or against the rule, with which they readily read J. No. 1. 12" N, and hold their print as they should. Distant vision is changed but little. I have not seen this condition mentioned by anyone, and yet I know from its comparative frequency in my practice, that it must be a common observation with all of you. I find it mostly associated with some heterophoria, but not always, nor is the heterophoria, when present, of any special type. The correcting cylinder has always given the coveted relief, and in no instance have the muscles required any treatment. As a typical case I will insert one already reported to the Minnesota Institute of Homeopathy.

Miss Louise H. G., æt. twenty-four, teacher. Asthenopic symptoms for the past five years, more especially since school opened three months ago, since which time she has had severe and frequent headaches in the forehead, sinciput and occiput after using the eyes; slight conjunctivitis. Holds print nine inches from eyes.

Examination gives  $\frac{2}{20}$  in each eye, will not accept any lens.

Esophoria of two degrees ; prismatic exercise was advised and entirely relieved the esophoria, but did not relieve the asthenopia or the headache. She continued to hold print at nine inches from reading. A mydriatic was then used and revealed  $H + AH$ , corrected by 0.25 D. s. 0.25 D. c. ax. against the rule in each eye. The correcting cylinder was prescribed with relief of all symptoms and increasing to the normal her reading distance.

Many other cases might be cited, but I will not tire you with what I believe to be more or less familiar. I should be pleased to have someone who has given the subject thought explain the reason for the marked effect of glasses in these cases. The only explanation that has occurred to me is that in some way the error is sufficient to produce ciliary spasm in accommodation, while it does not have the same effect in distant vision, but it hardly seems that this should be true through many years of varying health while all of my cases claimed to have been "near-sighted all their lives."

Next on the list I would place those cases that suffer from asthenopia or headache in whom the distant vision is greatly improved by weak spheres or cylinders. The extent of improvement being in excess of what one would naturally expect from such, weak lenses, and there being no general or local condition other than the refractive error to account for the patient's discomfort.

Third on the list I would place those cases which, while they may see little or no better with the glasses, yet experience a definite sense of relief with them on, and promptly and persistently select the same lenses with the same axis for the cylinders.

Fourth, all cases of heterophoria accompanied by slight degrees of refractive errors whether glasses are readily selected or not. In the latter case a mydriatic should be used. No sufferer should be denied glasses until the refraction has been ascertained under a mydriatic.

Conversely, I believe but little can be accomplished with weak lenses when not promptly selected either with or without a mydriatic, and further that no patient who can be relieved of his sufferings by other and gentle means should be subjected to the discomfort and inconvenience of glasses.

## THE EYE AND THE NOSE.

BY JAMES A. CAMPBELL, M. D., ST. LOUIS.

The influence, upon other parts, of abnormal conditions of the nasal passages, whether it be from hypertrophy of the mucous tissues, enlargement of the turbinates, deflections of the septum, or tumor growths, is generally admitted and is fairly well understood.

Every oculist, even of most limited experience, is aware of the intimate relationship existing between diseases of the nose and the eye. The ocular complications most generally reported under these conditions have been those of an inflammatory character, and these are comparatively frequent. Persistent conjunctival inflammation, deep-seated ocular congestion, sensitive painful eyes, blurred vision, and ciliary spasms, are the forms usually commented upon.

Within the past year or more I have been interested in tracing the direct relationship between nasal irritation and heterophoria in certain cases, and, in the light of these observations, I am convinced that this relationship of direct cause and effect is not of infrequent occurrence. I beg leave to offer a few cases in confirmation of this fact :

Mrs. S. R., age thirty-six, had suffered for several years with much pain in her eyes and head, which would invariably follow the slightest use of eyes. She had been treated for this by a well known Eastern specialist who correctly diagnosed her case as exophoria. For six or seven months he had tried every form of treatment except the usual partial tenotomy ; why this was not done was not explained.

When the patient came to me she was wearing neutralizing

prisms  $4^{\circ}$  base in, on each eye, which, while they did not free the eyes from annoyance, rendered their use somewhat more comfortable for a short time.

A careful series of examinations failed to discover any optical anomaly or other direct cause for the trouble, except an exophoria measuring  $10^{\circ}$  in each eye.

Examination of the nose revealed an almost total occlusion of the nasal passages from hypertrophic rhinitis and turbinated enlargement on the right side, the inferior turbinated bone wound around like a large scroll, about filling up the nose space on that side. On the left side the puffy, spongy, swollen tissues quite closed the passage.

She informed me that she had been unable to breathe through the nose with any certainty or comfort for many months, and that she had suffered much from this obstruction. She had frequent pains between the eyes and all through the head.

From the general symptoms and conditions present, I felt convinced that a certain amount, if not all, of her eye trouble found its origin in the nose, and the case was conducted with this theory in mind. The enlarged turbinate on the right side was removed with the saw; the hypertrophied tissues on the left side were reduced by operative measures, principally galvanic-cautery. Gradually the patient was enabled to breathe through the nose and the pains in the head ceased, and in three weeks the exophoria had decreased to  $5^{\circ}$ . The improvement in her general condition is very marked. The neutralizing lenses were taken off. Each week the exophoria grows less, and the patient affirms that her eyes and head have not felt so well for several years.

Mr. L. E. D., age nineteen, a bookkeeper, came to me one year ago. His vision was always excellent, but for a year or more his eyes were painful on use and he had suffered very much with headaches over the eyes, extending to the back of the head.

Tests showed hyperopia requiring  $+ 3.5$  D. for correction in each eye; he had also esophoria  $3^{\circ}$  in the right eye and  $2^{\circ}$  in the left. He was given  $+ 3$  D. for constant use, and advised to give the eyes a short rest.

Immediate improvement in reference to pain in eyes and head followed; but as soon as he went back to his books the old-time pains began again. The esophoria was still present. He was put under treatment—prismatic exercise, electric stimulation, and

internal remedies—which was followed by some improvement. For several months he was better and worse in turn.

He was not aware of any nasal trouble, but a certain nasal twang in the voice induced me to examine his nose, and a considerable enlargement of the left middle turbinated bone, occluding the upper third of the meatus, was revealed. The obstruction was removed, and immediate relief from all the eye and head symptoms followed, and continues to this day.

In a third case, another hyperope, a most obstinate and unyielding conjunctival inflammation was finally reduced to a condition of comparative comfort, but use of eyes was always painful and headaches were frequent, in spite of proper optical correction. Finally, chance directed me to examine his nose, and there a partially occluded left nasal passage, from a spongy, swollen turbinate, was discovered. Its removal was followed by entire relief from, not only the conjunctival congestion and sensitiveness, but likewise the long-endured headaches.

Quite a number of similar cases could be offered, but the above are sufficient to illustrate the fact I desire to impress, that heterophoria is frequently the result of reflex nasal irritation; and when this is the case, no form of operation upon the eye muscles will do anything but harm, and relief will only be obtained when the cause is recognized and removed.

## ADENOID TUMORS OF THE NASO-PHARYNX.

BY ROBERT CARR BLOCK, M. D., ST. LOUIS, MO.

We find that the upper pharyngeal space known as the naso-pharynx is the seat of various forms of growth. Among others adenoids, fibroids, fibro-mucous polypi, and malignant tumors, as sarcoma and carcinoma, but as the presence of any of these neoplasms, with the exception of the first mentioned, is of rare occurrence they will not be discussed here.

The naso-pharynx, according to Luschka, includes the space extending from the basilar process of occipital bone to the free edge of the soft palate, about  $\frac{3}{4}$  of an inch in vertical diameter, the same antero-posteriorly, and  $1\frac{3}{4}$  inch in width, though these dimensions are subject to much variation. Lined throughout with a mucous membrane freely supplied with glands, its principal landmarks are the openings of post naris, those of eustachian tubes, and the pharyngeal third or Luschka's tonsil.

Among the causes of adenoid growths may be mentioned the influence of heredity, children of strumous diathesis being peculiarly susceptible to an excessive development of glandular tissues. Chronic hypertrophic catarrh or any obstructive condition of the nares may be included in the list of predisposing causes, while a chronic hypertrophy of the faucial tonsils is nearly always an accompanying condition.

These growths are with few exceptions those of childhood between the third and fifteenth year; as to whether or not they are ever congenital authorities differ. I believe

that they oftentimes are. In this connection, a French writer, Lubet-Barbon, speaks of the difficulty of nursing with infants so affected, and their consequent malnutrition through inability to receive proper nourishment. After the twentieth year the tendency is to atrophy and they frequently disappear by the thirty-fifth year, though there are many exceptions to this rule.

To the experienced observer the victim of extensive adenoid growths and consequent mouth breathing presents a typical appearance suggestive of lack of development, physical and mental; the countenance is heavy, the nose is pinched and blunted, the mouth stands agape, the eyes have a bleared appearance, due to the lower lids being drawn down, and in advanced cases the chest may have assumed the chicken breast form. In about seventy-five per cent. of cases, ear complications exist, hearing being impaired. Nasal resonance is diminished, the sleep is broken, snoring, unpleasant dreams, and awakenings the common accompaniments, while a chronic pharyngitis and muco-purulent discharge from the naso-pharynx are attending symptoms.

This picture may be very much modified in cases of less degree of obstruction, but the countenance of the mouth breather is generally suggestive of the condition.

Before giving an opinion or advising operation the physician should make rhinoscopic or digital examination. The former is impossible in many cases on account of the youth and intractability of patient and narrowness of pharyngeal space; the latter, that of passing the properly disinfected forefinger behind the velum palati, is with proper care attended with little inconvenience to the patient, and discloses to the trained sense of touch the exact location and extent of the obstructive growth—feeling frequently, as has been aptly described, like a mass of earth worms.

In cases where the obstructive symptoms are not pronounced, it is well to employ a course of local and general treatment combined with proper hygienic surroundings

before resorting to surgical methods. Daily or tri-weekly applications of iodine and tannic acid combined with glycerine following a thorough cleansing of the parts with some alkaline solution have given excellent results.

If, however, there be marked obstruction to free respiration, the pernicious and permanent ill effects entailed by delay are such as to render temporizing measures unwise, and an operation is always advisable.

Numerous are the methods advocated by different surgeons. Among them the application of various acids, the adenotome forceps, cautery, and cold snare, and the finger tip and Gottstein's curette.

If the patient is tractable, and the pharyngeal space not too contracted for observation, any of these measures may be employed to advantage without the use of other anæsthetics than cocaine, bearing always in mind that the operator should stop at nothing short of the complete removal of all abnormal adenoid tissue.

Sometimes the growths are of such a friable nature that they can be readily scraped away by the finger nail, and with such cases in clinical work, it is my practice to do this at the time of making digital examination, the amount of pain occasioned thereby being slight; but in the majority of cases general anæsthesia is necessary, chloroform being preferable to ether. In operating, the head of the patient should be lower than the body. This is done to guard against the danger of blood flowing into the larynx and thereby causing asphyxia.

The mouth gag being adjusted by an assistant who controls this and at the same time firmly holds the head, the surgeon depresses the tongue. If the tonsils are hypertrophied, and they usually are, it is proper that they be removed at this stage of the operation; this having been quickly accomplished, the curette is passed behind the velum palati, and the adenoid tissue—the location and extent of which having been determined by previous examination—is scraped away, the forefinger then being passed to ascertain if the work has been thoroughly done, and the few granula-

tions that may remain after curetting oftentimes can be removed by the finger nail.

I usually employ the Gottstein curettes; two instruments with blades of different curves being necessary, one for the roof and the other for the posterior wall of the pharynx. There is also an additional curette for growths upon the side walls, but this is seldom used.

As a rule it requires but a few seconds to do this operation, including the excision of tonsils; the hemorrhage is profuse, but has practically ceased by the time the operation is finished.

It is advisable that the patient be confined to the bed for a few days to guard against hemorrhage, taking cold, and infectious micro-organisms, to which last he would be very susceptible until the healing process is complete. Forty-eight hours after operation and each succeeding day thereafter the naso-pharynx should be gently sprayed with some cleansing solution, for which purpose listerine 1 part to 6 of water is a valuable agent.

While there are exceptions to the rule, in no class of surgical cases are happier results obtained than follow the removal of obstructive adenoids; the general nutrition of the body is markedly improved; the tendency to recurrent catarrhal colds, which is always an attendant, disappears, and the other distressing symptoms are oftentimes markedly benefited or entirely removed.

## THE USE OF MYDRIATICS IN THE DETERMINATION AND CORRECTION OF ERRORS OF REFRACTION.\*

BY E. H. LINNELL, M. D., NORWICH, CONN.

The question as to the desirability of paralyzing the accommodation before correcting errors of refraction is one upon which the opinion and practice of oculists differ widely. My own views and methods have become somewhat modified in this direction of late, and while I have nothing new to offer, a comparison of experience, and a discussion of methods, where specialists are not agreed, is always instructive.

There can be no dissent from the statement that the test with trial lenses, with the accommodation perfectly at rest, gives the most scientifically accurate results, and that atropine is the most thorough and reliable mydriatic to use.

In hospital and dispensary practice, its routine employment is perhaps justifiable and desirable. But in private practice there are very many objections to its use, and it is frequently contra-indicated by the conditions and circumstances of the patient. It is not worth while for me to enumerate the disadvantages attending its employment. They are familiar to you all from your own experience, and to a greater or less degree they attend the use of the various other mydriatics. I think we are all agreed that cases constantly present themselves where we must fall back upon other tests, and in proportion as we acquire skill and experience with other tests will we find it unnecessary to

\* Read before the Am. Inst. Hom., Denver, 1894.

use mydriatics. Scientific accuracy is of secondary importance, and the comfort and well-being of our patients is our first consideration. It is desirable always and sometimes essential to ascertain positively the full error of refraction, but sufficiently accurate data to enable us to prescribe suitable glasses can, I believe, be obtained in the large majority of cases, by other means. Therefore it should be our aim to avoid the inconvenience and danger attending paralysis of accommodation whenever practicable. We frequently find that the full error as revealed by atropine cannot be corrected, and, personally, the necessity for its use occurs less and less often in my practice. Formerly I used it as a rule in myopia and astigmatism, and very rarely corrected a myopic astigmatism without it. The test with glasses still is, and always must be, the crucial one, and I would not depend upon either an ophthalmoscopic diagnosis, upon retinoscopy, or the ophthalmometer of Javal alone, or upon all of them, if the patient rejected the glasses indicated. I regard all three methods as very valuable control tests, and when, by the use of one or more of them, we arrive at the same results as with trial lenses, and when the glasses so selected are comfortable and satisfactory to the patient, I believe we are warranted in prescribing them, and that we will attain satisfactory results, and relieve asthenopic and reflex nervous disturbances.

The muscular condition is an important factor to be remembered in the prescription of glasses, and influences me in the use of a mydriatic. It is evident that esophoria is often associated with ciliary spasm, and that the presence of exophoria in a given case makes atropine less desirable. My rule, then, is to avoid paralyzing the accommodation as far as I can, consistently with accurate prescribing.

But however expert or skillful we may become with the ophthalmoscope and the more recent methods of examination, there will always remain cases where the accommodation must be put at rest.

Some years ago, I had the honor of reading a paper

before the N. Y. State Hom. Soc. upon the "Determination and Correction of Astigmatism," and at the same meeting, the late Dr. Geo. S. Norton discussed the merits and demerits of atropine in all the various errors of refraction. His conclusions, based upon the examination of upward of one thousand eyes, were substantially the same as my own, and although my views as to the frequent necessity for its use have become modified as I have learned to rely less exclusively upon the trial with glasses, Dr. Norton so well expressed the indications calling for it, that I would like the privilege of quoting from his address. He says: "In ordinary cases of refractive anomalies of all kinds, where glasses can be given and worn at once with perfect comfort, no necessity arises for further examination. But if the glass the patient apparently requires cannot be worn at once with perfect ease, or if the test seems to vary from one moment to another while making the examination, or if there is Em. or a low degree of M., or As., myopic or hypermetropic, with asthenopic symptoms, headache, or nervous disturbances, especially combined with esophoria, then I always advise an examination to determine the full error of refraction." ["Trans. N. Y. to State Soc.," 1890.]

To the above I would add, when marked spasm of accommodation seems to exist, where a decided discrepancy is manifested between the other tests referred to and the trial with glasses, or where, though the results are the same with all tests employed, yet the indicated lenses are not accepted, these conditions warrant us in paralyzing the accommodation; but Dr. Norton adds that he did so less and less frequently as he made more use of retinoscopy and the ophthalmometer.

If we have decided that a mydriatic is necessary, how shall we select the one most desirable in a given case? Atropine is undoubtedly the most reliable and thorough. In young persons it is usually preferable. In adults, or where for any reason it seems undesirable to employ it, homatropine, a 2 per cent. solution alone, or in combination

with cocaine, will ordinarily be satisfactory. It is open to the objection that it does not in all cases thoroughly paralyze the accommodation, but this objection has little weight with me, for, in such cases, the whole error as revealed by atropine could hardly be corrected. I have had only a very limited experience with hyoscyamine. But in several instances have had unpleasant poisonous effects, and therefore consider it less desirable.

## GALVANO-CAUTERY IN EYE DISEASES.

BY JAMES A. CAMPBELL, M. D., ST. LOUIS.

For the past ten or fifteen years galvano-cautery has had a recognized place in ophthalmic therapeutics. It has been recommended and applied in almost every form of external inflammatory process involving the eye and its appendages.

In the earlier, and even in the later days of its use, the lack of delicacy in the form of electrodes offered, and the uncertainty in the generation and control of the electro-cautery current, together with the ever-present danger of over doing, prevented a more general introduction and use of this most valuable method, and is the reason, even to-day, that many ophthalmologists look upon it with aversion.

In 1873, Matmache \* wrote upon "Ulcers of the Cornea Treated by the Actual Cautery." From that time to the present day many valuable contributions on the topic have appeared, the most voluminous and notable of which is that of A. Nieden, who, in the *Archives of Ophthalmology* (Vol. IX., pp. 26-455), reports two hundred cases of various diseases of the eye treated by galvano-cautery. Eminent men, in various lands, have confirmed his statements and commended the practice in highest terms.

The list of disease complications in which it has been used includes all forms of corneal ulceration, neoplasms and tumors of the eye and eyelids.

I realize that this is neither the time nor occasion to discuss this very extensive subject in full; I merely desire

\* *Pacific Med. and Surg. Journal*, 1873, p. 294.

to thus introduce it in connection with the report of one of the most brilliant successes which it has ever been my fortune to witness, which will represent the type of disease where galvano-cautery is most useful, and will at the same time illustrate the method of its manipulation.

A few months ago Miss K. B. came to me with the following brief history: About three years before both eyes became weak, were red and ran water. These symptoms gradually grew worse and worse, and, after varied treatments, she had placed herself under one of our best known old school specialists about seven months before I saw her, and during all this time had received daily treatments. The eyes grew steadily worse and worse, until the vision was much involved and the pain was excessive, almost entirely preventing sleep for some days preceding the time of her visit to me. The left eye was the more involved. Its vision was  $\frac{15}{200}$ . On the outer sclero-corneal margin was a large ulcer spot in a thickened elevation of tissue. From this spot heavy meshes of vessels radiated outward over the sclera and inward to the center of the cornea. It was, in short, a phlyctenular disease involving both the conjunctiva and the cornea.

The patient was of a marked scrofulous diathesis, with enlarged cervical glands.

The ordinary treatment for such cases seemed to make very little impression upon it; in fact, there was every evidence of the extension of the ulcer spot, its ragged edges breaking down, and it seemed to grow deeper by degrees. After a week's unavailing treatment, fearing a large perforation and loss of the eye, I resolved to use the electro-cautery in the case. Under a four per cent. solution of cocaine mur., the ulcer and neighboring parts were touched with a bulbous pointed eye electrode brought to a dull red heat. No pain of any consequence was experienced by the patient.

The rapidity of improvement which followed this application was to me little short of phenomenal. In less than two days the ulcer had closed in on all sides, being scarcely visible, and the surrounding and tributary elevated meshes of blood vessels had almost entirely disappeared. In one week the eye was practically well, and in a very short time all evidences of trouble had vanished.

This was an exceptional case ; yet I have used this line of treatment on other similar cases with magnificent, if not quite as brilliant, results.

For the control of the cautery current I use what is known as the "Aloe Converter," which brings the ordinary city electric light supply under most perfectly regulated control. The ordinary handle used in general electro-cautery work is too large and clumsy to use in such cases, but the handle and electrodes specially made for the purpose permit of exact and delicate manipulation. I take pleasure in exhibiting the converter and appliances used in these cases.

## A SUCCESSFUL CATARACT OPERATION, UNDER DIFFICULTIES.

BY HAYES C. FRENCH, M. D., SAN FRANCISCO.

In February, 1894, Dr. J., a homeopathic physician of Guatemala, aged about fifty-eight, came to the writer with hypermature cataract of the left eye. The lenticular changes commenced about two years previous to his visit, with pains in the globe and temporal region and what, from his description, must have been serous iritis, the tension having been considerably increased from that time to the period of his visit to us. He had dallied with the case under advice from his colleagues, trying various expedients in the hope of inducing absorption, being advised against extraction as offering little hope of success. The case was further complicated with chronic catarrhal conjunctivitis.

The patient had long suffered from indigestion and mal-assimilation owing to the villainous Guatamalan dietary to which his American stomach had for years been subjected, and withal he was an inveterate cigarette smoker. After treating the conjunctivitis and general catarrhal condition for two weeks, on February 8, assisted by Dr. Ella G. Pease, I removed the cataract by the modified linear method, making a generous iridectomy on account of the glaucomatous history of the case, and increased tension at the time of the operation. The operation was smooth and free from complication of any kind, and the toilet was nearly completed when a sudden involuntary spasm of the orbicularis sent a gush of semi-fluid vitreous out through the wound and down the cheek. The cornea was completely collapsed and the case for the moment seemed to the last degree unpromising. Without further effort to improve matters or clear the pupillary space the lids were closed and held in position by

narrow strips of Seabury & Johnson's fine silk adhesive plaster. The ill-conditioned vitreous still continued to ooze through the closed lids. The first twenty-four hours passed without any signs of inflammation, the ball having rounded up to a gratifying extent, the case began to assume a hopeful aspect. He was from the first allowed the liberty of the room and as much light as could be borne with comfort. The third day the cornea had attained its normal convexity, presenting a perfectly healthy appearance. On the fifth day all dressings were removed. On the fourteenth day an ophthalmoscopic examination revealed a perfectly unclouded but slightly atrophic disc. With a three inch double convex glass he could with some difficulty read Snellen's No. 6 type, and readily discern large objects at six or eight feet without a glass. Vision continued to improve slightly up to the time of his departure for Guatamala on April 28.

This case is of interest as showing the triumph of the most delicate surgery when smoothly done and under rigidly aseptic conditions. The circumstances of the case that pointed to possible failure were: The history of pain at the inception of the cataract and continuing for some time, with persistent photophobia, notwithstanding the opaque lens; the anæmic and ill-nourished condition of the patient, with chronic nasal and conjunctival catarrh; the increased ocular tension throughout, and failure to detect the position of a lighted taper at a distance of fifteen feet previous to extraction, and the hypermature lens with partial synchysis of the vitreous body. Had there been any flaw in the operation, or fault in the aseptic conditions we have little doubt but that our worst fears would have been realized in this case. We give the result as an encouragement to our colleagues during the anxious hours that are apt to follow even the most favorable and promising cataract operations. The only disastrous cases that have fallen to our lot failed, one solely from lack of proper hygienic accompaniments, and the other from this, together with a failure to make a large enough opening for the delivery of the lens. In our observations of the misfortunes of others the following causes of failure have been noted: Some

hitch in the operation interfering with its absolute smoothness; failure to make the cut in a continuous plane; hypermature cataract; inability to use the left hand with the same facility as the right, and miscalculation as to the size of the lens and failure to make the corneal opening adequate for its delivery.

## HYPOPYON KERATITIS.

BY GEO. C. McDERMOTT, M. D., CINCINNATI, O.

I wish to restrict the term hypopyon keratitis to that serious and frequently fatal condition of the cornea, the result of infection attending the injury to the eye. While blenorrhœa of the lachrymal sac is at times a predisposing cause, yet it is to cases resulting from traumatism that I wish more particularly to direct attention.

Saemisch found it in some thirty-two per cent. of serpyginous ulcers of the cornea. The cases which I have treated were below the normal standard of health and repair. The combination, then, of ulcer of the cornea and pus in the anterior chamber has received the name hypopyon keratitis. The term "infecting or sloughing ulcer" is an appropriate one, too.

*Cause.*—A sloughing ulcer of this kind depends upon local infection, and most frequently results from an injury to the cornea from a flying piece while breaking coal, stone, or other hard substances, from a beard of wheat in the harvest field, or other slight injury, destroying the epithelium of the cornea, and thus preparing the way for infection of the wound. The sloughing develops forthwith and is not preceded by an abscess.

*Course.*—In the inflammatory or active cases there are very severe pain and photophobia, more or less redness of the conjunctiva, and muco-purulent discharge.

At an early stage of the disease there is found pus in the anterior chamber. This has the appearance of a yellow mass, and is bounded by a horizontal margin. In others the

course is very different. The patients are indifferent to the slight annoyance the eye gives them, and but little disturbed by the redness of the eye, the lachrymation, or impaired eyesight.

The course in many cases runs a rapid one. In a week it has sometimes destroyed the greater part of the cornea, while the torpid purulent infiltrations often spread with considerable rapidity and destroy the cornea by sloughing.

The existing hypopyon varies in extent from a small quantity to the filling of the anterior chamber.

*Prognosis.*—The prognosis depends largely upon the promptness of the treatment. Delay is most ruinous. If seen early and proper hygienic and local treatment is instituted there is a possibility of saving the eye as a member of vision. If, however, extensive infiltration and sloughing have occurred there is but little hope, if any, of saving eyesight.

*Treatment.*—Locally, a wash, for cleansing, of boric acid, ten grains to the ounce and repeated several times during the twenty-four hours. I advocate the persistent and judicious use of peroxide of hydrogen, 1-4, and use at least twice a day. Atropine, a four-grain solution, to produce and maintain a fully dilated pupil, thereby lessening the tendency to iritis or hyperæmia of the iris. A protective bandage and a most generous and stimulating diet. If, in the face of all this, sloughing and a greater destruction of tissue threaten, the famous and successful operation of Saemisch is most urgently needed. I prefer this to the galvanic cautery, and advise its use first. If unsuccessful, the second operation is with the cautery. A compress bandage must be used in cases of threatened perforation, and for a time after recovery, to prevent staphyloma.

In so far as internal remedies are concerned I find the following to be the most generally used: Arsenicum, hepar sulph., merc. sol., calc. hypophos., and silicea.

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## A FEW EYE CASES OF REFLEX ORIGIN.

BY EMMA L. BOICE, M. D., TOLEDO, O.

There is no organ or part of the body in such constant use as the eye. It is never at rest during our waking moments, and in consequence must become exhausted, and ready to sympathize with and be affected by diseases in other parts of the body. So that in many cases treatment applied to the eye alone will simply palliate and not remove the complaint.

It thus becomes the duty of the specialist to widen his views and not attribute every eye symptom to disease of the eye or its accessories, but search for the cause, even if in a remote part of the body, and remove it if possible.

I will cite a few cases in illustration.

CASE I. May, 1891, Mrs. B., age forty-five, complained of severe pain in right eye, neuralgic in character, with pressure so great that it would seem as if the eye must burst. The patient was wringing her hands and writhing in agony. There was no lachrymation, redness, photophobia, or swelling.

Subjectively her symptoms were glaucomatous. Objectively there was simply commencing cataract. Absolutely nothing about the eye to cause any pain. Nasal examination revealed an enlarged turbinated body, pressing on the septum. Patient did not complain of any difficulty in breathing. After reducing the swollen turbinated body with a four per cent. solution of cocaine, I cauterized with chromic acid.

This operation was repeated twice, resulting in an entire

relief from all trouble. The paroxysms of pain had been coming on at intervals of one or two weeks; in the meantime the patient was comfortable, except that she could not use the eyes.

November, 1893, patient again appeared, saying that she felt a little pressure, and was going to treat it in time. A mild cauterizing relieved the distress. She reported that she had been able to use her eyes in the most severe literary work without any discomfort.

The cataract had not advanced, neither has it disappeared.

CASE II. Mrs. C., central perforating ulcer of cornea, right eye, with all the attending symptoms—pain, photophobia, lachrymation, etc., also fluent coryza.

As patient said she had a hard cold, I did not examine the nose. But as the ulcer did not improve under treatment, I later on examined and found polypi in both nasal passages. Removed both with Bosworth's cold snare. One was about three-fourth inch in diameter, the other three-eighth inch.

After this the ulcer rapidly healed, leaving only a slight macula.

CASE III. Mrs. G., June, 1893, asthenopia. Cannot use the eyes at all for reading or sewing without headache. She was under another oculist's care the preceding year, was wearing convex .50 D. cylindrical lenses, and was advised to have internal recti tenotomized, but declined.

I found that there was no heterophoria and that the astigmatism was properly corrected, so was obliged to look for some extrinsic cause. This I found in the teeth, the canine and first bicuspid on one side being filled with gold and amalgam, respectively. Sent her to a good dentist, who found the amalgam-filled tooth ulcerated, and extracted it. Result, complete relief from all headache and asthenopia.

Right here I would say that I consider many of the cases of asthenopia due to faulty dental work, and the reprehensible practice of putting gold and amalgam fillings in the same mouth, often in the same tooth. The better class of

dentists are refusing to do it, in spite of the demands of their patients, realizing that the damage is almost as great as from the cheap mercury plates for artificial teeth, so much in use.

CASE IV. Miss N., bookkeeper. Sent by Dr. Maxwell with history of daily headaches aggravated by use of eyes. He also reported rectal and uterine trouble. On examination I found vision normal; esophoria 1° for distance, exophoria 4° for near vision. Decided to postpone eye treatment until after she had recovered from the rectal and uterine trouble.

Dr. Maxwell removed some pockets and papillæ from rectum, curetted and packed uterus. The result was complete relief from headaches.

I again examined the eyes two months after the operation; found vision normal, no heterophoria. Patient had returned to her work and still continues at it, with no discomfort.

## HEADACHE WITH WEAK INTERNAL RECTI MUSCLES.

BY THOS. M. STEWART, M. D., CINCINNATI, O.

I wish to report briefly two cases showing the effectiveness of prismatic exercise in overcoming weak internal recti muscles. This is a subject which at once opens the way to a discussion of all the reflex troubles of the eyes, but my object is simply to select two of the very worst cases occurring in my practice during the past year and to offer them as a protest against indiscriminate operating in affections of the ocular muscles.

The first case is that of a young married man, a book-keeper, age about twenty-eight. Suffering for two years with dull aching pain in the left eye and left side of the head. Headache clearly traced to use of the eyes, and various glasses had given no relief. Muscles O. K. Examination under hyoscyamine showed a small degree of mixed astigmatism in the left eye, and compound hyperopic astigmatism in the right eye. He had been wearing minus cylinders in each eye. Verified the test with the ophthalmoscope and proved its correctness by a patient trial in the office; but the left eye still gave a little trouble. Examination of the muscles in accommodation showed an exophoria of  $10^{\circ}$ , or weak internal recti muscles.

Prismatic exercise was begun with prisms ranging from  $2^{\circ}$  to  $5^{\circ}$ , bases out. Relief from strain at near work was at once experienced, and has continued during severe work.

The other case was one of headache—an eight years' complaint—in a woman, age forty-seven years. A thorough physical examination was given this case in the very beginning of my treatment, and the trouble could not be traced to the kidneys, heart, stomach, or any other organ with the

exception of the eyes. She had been wearing, as the latest glass,  $+1. D^s. \bigcirc + .25 D. cy. ax. 90^\circ$  in each eye. Examination showed a mixed astigmatism in the R. eye and a compound myopic astigmatism in the L. eye. Examination of the muscles showed an exophoria of  $12^\circ$ . Glasses were ordered for distance: R. eye,  $+ .25 D. cy. ax. 60^\circ \bigcirc -0.50 D. cy. ax. 150^\circ$ ; L. eye,  $-.25 D^s. \bigcirc -.25 D. cy. ax. 120^\circ$ . For near work the presbyopia modified the prescription to  $+ 1.50 D^s. \bigcirc - .50 D. cy. ax. 150^\circ$  in right eye, and a  $+ 1.75 D^s. \bigcirc + .25 D. cy. ax. 120^\circ$  in left eye.

In order to test the statement that muscular defects were dependent upon refractive errors I did not begin prismatic exercise in this case at once, but deferred that until later. A subsequent report was received, and no relief from the dull aching in eyes and back of head had been experienced. Prismatic exercise was begun, and after the first ten days relief began to come, and the case is now cured. During the treatment of this case ten others were being held back in order to determine how much refractive errors had to do with muscular defects. Of these cases three were of mixed astigmatism, and the error of refraction had been carefully worked out under a mydriatic. Not until proper prisms had been prescribed did they obtain relief. In these troubles, as in everything, discrimination must be practiced. Careful examinations not only of the eyes but of the general system must be the first step, that we may exclude from our records such cases as have some physical condition other than eye trouble which may be a cause for headache. In conclusion let me say that in weakness of the superior, inferior, and external recti muscles prismatic exercise does not produce such quick and brilliant results. But I rather think it the part of wisdom to get all the good possible from prisms before resorting to tenotomy—not that I deprecate operating in heterophoria, but rather that we may secure better results by not falling into a routine because of the ease with which apparently good results are obtained at the expense of accurate examinations and scientific treatment.

## THE USE OF SCOPOLAMINE HYDROBROMATE IN DETERMINING ERRORS OF REFRACTION.

BY F. G. RITCHIE, M. D.

As this drug is a comparatively new one in ophthalmic literature, it may not be out of place to devote a few minutes to its history and medical properties.

Scopolamine, the alkaloid, belongs to the group of tropeines, and is obtained from the rhizome of the *scopolia atropoides*.

The genus *scopolia* is the connecting link between *atropia* and *hyoscyamus*, closely resembling the former in the microscopic character of its rhizome, but differing from it in the inflation of its calyx, and in that its fruit is a dehiscent capsule and not a berry. It receives its name from Dr. John Anthony Scópoli of the University of Pavia, who first described it as an *atropia* from Idria: it was later made the type of a new genus, *scopolia*, by Jaquin. It is indigenous to Bavaria, Austro-Hungary, southwestern Russia, and Japan, where it is found in the hilly districts, growing in damp stony places.

The alkaloid scopolamine is found in traces in belladonna root, stramonium seeds, and *duboisia myoporoides*. It is isomeric with cocaine, and forms permanent crystals having the formula  $C_{17}H_{21}NO_4 + H_2O$ , which melts at  $138^{\circ}$  F. to a colorless liquid. It is decomposed, in the presence of baryta, into a crystalline base, scopoline, and atropic acid. Commercial hyoscine hydro-bromate is said, by E. Schmidt, to often consist almost entirely of scopolamine hydrobromate, while Hesse considers the two as identical.

Kobert's experiments have shown that this substance is opposed, in general physiological action, to atropine: it does not stimulate the cerebral cortex (like atropine), but paralyzes it; it does not accelerate the pulse, but retards it. According to Rählmann, it is similar in strength of mydriatic action to hyoscine, without sharing its disadvantages. It does not disturb the appetite, nor give rise to dryness of the throat in normal doses, neither is its continued use followed by the flushing of the face, the frequent pulse, and the nervous restlessness which is such a frequent accompaniment of the prolonged use of atropine. It is claimed, moreover, that its local use is not followed by any increase in intra-ocular pressure, even if tension is pathologically increased. He has used it advantageously in a number of cases of chronic inflammation with secondary glaucoma, and in one case of absolute glaucoma, in which there was marked irritability of the eye with pronounced ciliary injection and hyperæmia, the pain ceased, the eye became quiet, and the blood disappeared from the anterior chamber. He has had no experience with the drug in the acute form of the disease.

In cases of incipient atropine poisoning or in those cases in which the patient shows a susceptibility to atropine, scopolamine is of great service, as it is more energetic than that drug in its local effects, and antagonizes its general effects. It is only after the exhibition of large doses of scopolamine that a sensation of dryness of the throat is produced, a symptom that is frequently noticed after a very moderate use of atropine.

L. Bellarminow deduces the following from his observations with the drug: Scopolamine is indicated in the same conditions as call for the use of atropine—especially to determine the anomalies of refraction and accommodation, owing to its marked effect upon the accommodation, which permits of a speedy and accurate determination; in addition, it considerably shortens the period of paralysis of the accommodation and mydriasis.

Dr. Thos. R. Pooley of this city reports his experience

with the drug in the *Am. Journal of Ophthalmology*, March, 1894, his observations extending over a period of six months. He used a solution of scopolamine hydrochlorate of the strength of one-fifth of one per cent. instilled at intervals of fifteen minutes for one hour previous to examination. In every instance complete paralysis of the accommodation was produced. Mydriasis was complete at the expiration of from ten to fifteen minutes, but it was necessary to make three or four instillations in order to suspend the accommodation completely. This was evidenced by inability to see at the near point, and by bringing out in the second examination the total amount of ametropia. The duration of its effect upon the accommodation was from twenty-four to forty-eight hours. He observed in several cases a diminution of the acuteness of vision, a fact which I have failed to discover in any of my cases. He also observed toxic effects in three cases occurring in patients who had purchased the drug themselves for use at home. In one of these cases, a miss of thirteen, with a history of convalescence from nephritis following an attack of diphtheria and cardiac palpitation, who came to the clinic after having used a one-fifth of one per cent. solution instilled six times in each eye, there was the following history: After the instillations she began to stagger, and talk in a thick, drunken, foolish way, and, at times, seemed to be out of her head. At the clinic the pupils were found to be widely dilated, there was constant working of the lips and muscles of the face; the pulse was from 120 to 130 beats per minute, and the heart's action very irregular. She had a staggering gait which precluded her walking without assistance. She complained of a sensation as if needles were under her feet on standing. There was no dryness of the throat or flushing of the face. During the following night she raved, and was out of her head. The effects of the drug were not fully recovered from until two days afterward. The two other cases referred to were females also, and were apparently in vigorous health. They presented the same symptoms, although in a less marked degree. These two cases,

however, complained of dryness of the throat. In one of these cases the symptoms subsided in twenty-four, in the other in forty-eight hours. Remarking on these cases, he observes that as the drug was used at home, a larger quantity may have been instilled, and may even have ran over the face into the mouth, and also call attention to the fact that more instillations were made in these cases than in those at the clinic. In this connection it may be well to call attention to an article of Dr. R. Ernst, in which he says "Scopolamine is speedily evacuated through the kidneys. Diseases of the heart constitute no absolute contra-indication for using this remedy, but renal diseases in advancing age and severe disturbances of nutrition do."

The writer has used a one-half of one per cent. solution of the hydrobromate of scopolamine in thirty cases of refractive errors, watching the effect of the drug as closely as was possible. These cases embraced every variety of ametropia. In only two cases was there the slightest suspicion of unpleasant effects of the drug, and these both occurred after a single instillation of one drop of the solution.

The first occurred in a young man, who, at a visit following the instillation of the drug, remarked: "What was that stuff you put in my eyes? I was so dizzy on my way to the ferry that I could not walk straight." He complained of no dryness of the throat.

The second case was that of a young lady, who, a few minutes after a drop was placed in either eye, commenced to grow pale, and on my inquiring if she did not feel well, replied: "Yes, but my head feels a little giddy, and I am a trifle nauseated." I proceeded with the examination, however, and the disagreeable sensations soon passed away. I will state here that both of these patients were of a markedly nervous temperament.

In conducting my experiments with the drug, I have first carefully tested the refraction by the acuteness of vision. I then instilled a single drop of a one-half of one per cent. solution of Merck's scopolamine hydrobromate and watched its effect upon the pupil and accommodation,

noting the time when the pupil commenced to dilate, and also its progress up to the point of complete dilatation: at the same time I directed them to look at the Jaeger test-type every few minutes and inform me when it first commenced to get indistinct when held at the ordinary reading distance and also when it became impossible for them to read it at any distance. When the accommodation was suspended I again tested them, and in several instances had them call each day in order to note the duration of the action of the drug upon the pupil and accommodation. In other cases, I directed the patient to observe carefully the time at which he could see to read distinctly at the ordinary distance, and also to record the time when the pupils regained their usual size.

In a number of cases I used repeated instillations of the drug three times a day for three days; and in still other cases I tested the parties again under the influence of atropine and hyoscine hydrobromate. In all these cases, with one exception, the tests did not vary from that made under a single instillation of scopolamine.

The results arrived at from a study of my series of cases differ somewhat from those of Dr. Pooley. The drug seemed to affect the pupil first, its action being apparent at the end of from ten to twelve minutes, while the accommodation commenced to be affected a minute or two later. Mydriasis was complete at the end of from twenty to twenty-five minutes. The effect of the drug upon the pupil lasted from five to six days; it commenced to wear off after twenty-four hours, the maximum time being six days, the minimum three, whereas Dr. Pooley gives it as from twenty-four to forty-eight hours. The effect upon the accommodation persisted from forty-eight to seventy-two hours.

## REPORT ON THE OPHTHALMOPLEGIAS.

BY DR. H. ARMAIGNAC.

(Concluded from Page 174.)

*Ætiology of the nuclear ophthalmoplegias.*—Nuclear ophthalmoplegia may be due :

1. To a primary or secondary alteration of the motor ganglionic cells.
2. To cerebro-spinal affections in general, tabes, disseminated sclerosis, Basedow's disease, syphilis, glycosuria, tuberculosis, diphtheria, poisons.
3. To a vascular lesion or a circulatory disturbance.
4. To a traumatism.

But these divisions have only a relative importance, for they may exist together or be sympathetic of each other.

If we take the first category, for example, we find that the secondary alteration of the nuclear cells may be produced by a vascular lesion, by syphilis, by traumatism, or by some other cause. Thus I shall give to these divisions only the value of facilitating, by subdivision, the complicated study of the ophthalmoplegias.

1. *Primary or secondary alterations of the nuclear cells.*—We have never seen an autopsy soon after the onset of a simple nuclear ophthalmoplegia; thus the primitive lesions are suspected rather than demonstrated. In cases where an autopsy has been made some days, weeks, or months after the appearance of the paralysis of the ocular muscles, there was ophthalmoplegia linked to a superior diffuse polyencephalitis (Benedikt, Gayet, Etter); in these cases, were found, in the nuclei of the oculo-motor nerves, the

same lesions of inflammatory degeneration as in the nuclei of the other bulbar nerves.

This degeneration of the nuclei may take several forms: simple congestion of the nucleus, hemorrhagic congestion, acute or chronic softening, vitreous degeneration of the cells (Westphal), sclerosis, etc.

This primary acute form of ophthalmoplegia has first been described in Germany by Wernicke, then by Westphal, Gowers, Bötiger, Ross, Thompson, Rogewnikoff, and quite recently by MM. Guinon and Parmentier, who have given an important work on the subject.\*

Unfortunately we know nothing positive on the ætiology of this dread affection, which is to the upper part of the cerebro-spinal axis what labia-glasso-pharyngeal paralysis or progressive muscular paralysis is to the portion of the axis which comes immediately below.

The alteration of the ocular-motor nuclei may likewise be due to cystic tumors, gummous or tubercular of the third ventricle, of the pons Varolii, or of the nuclear region, producing at a distance, or by immediate contact, a compression or a destruction of the nuclear cells.

In the cases of congenital or infantile nuclear paralysis studied by Möbius, there is reason to suppose, although not spoken of by the author, the existence of a primitive atrophy of the nuclear cells.

2. *Cerebro-spinal affections in general.*—Among the cerebro-spinal affections capable of producing ophthalmoplegia, locomotor ataxia occupies front rank, in which one finds both permanent paralysees and temporary paralysees and pareses. The latter are frequent and are probably due to circulatory disturbance with slight ependymitis. However, Déjerine does not believe that all the oculo-motor troubles noted in the course of a locomotor ataxia should be attached to nuclear lesions.

Disseminated sclerosis is rarely the cause of ophthalmoplegia. Dufour only found 2 cases in 220 observations.

\* Guinon and Parmentier. *Nouvelle Iconographie de la Salpêtrière*, 1890—1891.

In a case of general paralysis with paralysis of the sixth pair, Jessen found lesions in the nucleus of the origin of the external oculo-motor.

Finally, ophthalmoplegia has been observed sometimes, either simple or complicated with paralyses of other cranial nerves, in Basedow's disease (cases of Warner, of Ballet, of Jendrassik, of Fitzgerald reported by Dufour).

Among the general affections that are incriminated as producing nuclear ophthalmoplegia, although the other varieties (basal or orbital) are more frequent, I must cite congenital or acquired syphilis. Although, out of 220 cases, Dufour only found 23 (42 if we include 19 ataxies) of manifestly syphilitic origin, this proportion is astonishing, since, in general, syphilis is one of the most frequent causes of ocular paralyses.

Graefe believed that half the cases of ocular paralyses were of syphilitic origin, and Hutchinson declared in 1879 (basing his statement, it is true, on only 17 cases, of which 6 were tabetic) that nuclear ophthalmoplegia is probably always specific. Should not one explain the small percentage of syphilitic ophthalmoplegias by the fact that observations of this kind are rarely published because they are so often cured by specific treatment?

Glycosuria and polyuria are sometimes accompanied by ophthalmoplegia, but this is a rare occurrence in spite of the physiological relations of the floor of the fourth ventricle with this affection, and its continuity with the nuclear region of the oculo-motor nerves. For the same reason it is paralysis of the sixth pair that we observe most often.

Tuberculosis scarcely gives rise to more than basal paralyses, in consequence of basilar meningitis or of deposit of tubercular material at the base of the peduncles, in the vicinity of the pons Varolii. However, I have found in the medical literature a number of observations followed by autopsy in which there was found tumors of tubercular nature in the fourth ventricle or in the thickness of the pons Varolii (Badin, Hurtebise, Mackenzie).

Diphtheria often produces divers paralyses and among

these we sometimes find paralyse of the oculo-motor nerve. We do not know yet how diphtheria acts in this case. However, in two autopsies, Mendel and Remak have found: first, extravasations of blood in the external oculo-motor nerve with enlargement and swelling of the cells of the nucleus of the third pair; second, a marked hyperæmia with hemorrhages into the nucleus of the origin of the third and sixth pairs.

This localization of the lesions in the motor nuclei has also been equally demonstrated in other post-diphtheritic paralyse, not ocular (Déjerine). Ziemssen admits that a post-diphtheritic neuritis may begin in any ramification of the oculo-motor and extend in a centrifugal and centripetal manner, on one side toward the terminal extremities and on the other toward the bulbar nuclei which it may successively attack.

The last general causes that remain are those that result from poisons. Alcoholism takes first rank. According to autopsies, made in five cases by Wernicke, Thomsen, Kojewnikoff, the central lesion consists in a superior hemorrhagic polyencephalitis which invades the oculo-motors as well as the aqueduct of Sylvius and the third and fourth ventricles.

In a case of poisoning by sulphuric acid, Wernicke found an acute inflammation in the walls of the third ventricle with abundant punctiliform hemorrhages.

Tainted meat has produced in three cases (one followed by death), observed by Kraatzer, ptosis, paralysis of accommodation, and of the sphincter of the iris. It appears then that in this case the lesion may have altered the anterior part of the nucleus of the third pair.

3. *Vascular lesions or circulatory disturbances.*—It appears that the simple nuclear ophthalmoplegias due to spontaneous vascular lesions or to circulatory troubles should be numerous, and certain periodic ophthalmoplegias, with integrity of the intrinsic muscles, probably have no other cause; however, to the present time, no autopsy has confirmed this hypothesis. In some ophthalmoplegias, complicated by

paralyses of other cranial nerves, hemorrhages have been found, either in the nuclear region or in the fourth ventricle or contiguous parts, but these were almost always acute cases, promptly terminated by death.

4. *Traumatism.*—In traumatism of the head we frequently see subsequent isolated paralysis of the oculo-motors or true ophthalmoplegias, but in all the observations that I have gathered the disease terminated by cure and in such cases it is only by hypothesis that we can admit a traumatic vascular lesion of the nuclear region.

#### PROGNOSIS OF NUCLEAR OPHTHALMOPLAGIAS.

The prognosis of the nuclear paralyses is always subordinated to the history and to the general symptoms which accompany the paralysis. Out of 177 cases where Dufour has studied the complete evolution, 110 have had a chronic progress and ended fatally, 67 have progressed more rapidly and terminated in marked improvement or complete cure.

There exist then nuclear ophthalmoplegias capable of cure, and the prognosis should be given with extreme reserve.

#### V. CORTICAL OPHTHALMOPLAGIAS.

The indications of the cortical centers of the ocular muscles are few and contradictory. Hitzig, in 1873, at the Psychological Society of Berlin, announced that the cortical center for the ocular muscles, so long sought in vain, was to be found at the middle of the cortical center of the periocular muscles innervated by the facial. This center, then, could be shown at once as belonging to the muscles which move the eye and to those which protect it, and this easily explains the relation which exists between the movements of the eye and the lids.

One year later, Hitzig spoke more explicitly, basing his statement on experiments with dogs, consisting of excitation of certain parts of the cerebral cortex with weak electric currents. By exciting the orbital region of the nucleus

of the facial, which is connected with the center for the muscles of the eye, there followed occlusion of the lids of the opposed eye; and the eye, according to the place excited, deviated chiefly upward and outward.

As these movements appear to be only the resultant of all the muscles of the eye, he examined the action of each muscle by cutting all the others. It was thus that by exciting the cerebral cortex in a determined region of the anterior cerebral convolution, he succeeded in producing successively contractions of each of the four rectus muscles of the opposed eye.

On the contrary, Ferrier, in 1876, obtained movements of the eye by exciting quite another region of the cortex; by exciting the angular gyrus both eyes are deviated to the opposed side and are turned upward or downward according as one excites the anterior or the posterior half of the gyrus. The pupils usually contract and the lids close as under the influence of light.

Ferrier believes then that the angular gyrus is the visual center and that the movements are of reflex origin. The excitation of the visual center cause subjective luminous phenomena which themselves produce the movements.

Munk, in 1878, gave an opinion contrary to that of Ferrier. For him, the angular gyrus had nothing to do with vision, for the visual sphere was situated behind the angular gyrus in the occipital lobe.

By extirpating this region, the opposed eye gave phenomena explained by the fact that the cerebral cortex cannot effect the movement of the pupillary sphincter. The lateral movement of the eyes toward the opposed side, that is the movement to the right when the left angular gyrus is extirpated, is only incompletely effected and terminates quicker than in the normal state, and quicker than the lateral movement on the side of the extirpation. Other movements of the eyes seem equally changed, but this point is still but little studied. Finally, there is sometimes observed a slight ptosis on the side of the eye affected which disappears after one or two weeks. There is never any alteration of the pupil.

According to Carville and Duret the angular gyrus is also the cortical center for the muscles of the eye.

Hensen and Völckers say, incidentally, that they have once observed, in experimenting on a dog, by irritating the temporal lobe of the right hemisphere, isolated movements of the inferior oblique, but without being able to affirm if the contraction occurred in the opposite eye.

The movement appeared very clearly as soon as they applied the electrode on a determined region having no greater diameter than one millimeter.

Arloing believed he found, in the third convolution of Leuret, two contiguous centers, one appearing to preside over the lid movements on one side, the other over the lid movements of the opposed side.

Thus we see, authors' opinions are so diverse that one cannot even know, says Mauthner, if the cerebral cortex of one side regulates the ocular movements of the same side or of the opposed side or even both sides at once. We can say, however, that excitation of the most diverse regions produces ocular movements, and that destruction of these same regions may produce, perhaps, abolition of these movements.

Experiments on animals, then are almost negative in the point of view of localization of a cortical center for the ocular-motors. On the other hand the clinic and pathological anatomy do not permit us to establish in man a scientific diagnosis of cortical paralysis.

One muscle, however, seems to be excepted, the levator of the eyelid. Grasset was the first, in 1876, to speak of cortical paralysis after an observation followed by autopsy. Landouzy, in 1877, compiled eleven cases of isolated ptosis, from which he drew the conclusion that this paralysis may be due to a lesion of a part of the parietal cortex of the opposed side.

Bramwell, in 1877, Haddon and Jaccond, in 1878 (these two authors speak also of a double ptosis), attribute to ptosis a cortical origin, but Coingt, Charcot, Pitres, and Nothnagel are of an opposite opinion, and think that the

lesions found in autopsies are too little circumscribed to establish a relation between ptosis and the angular gyrus.

Besides, changes in the angular gyrus without ptosis are not rare, and perhaps in the observations cited in support of the cortical origin of paralysis of the levator, there was a concomitant lesion of the anterior part of the nucleus of the common oculo-motor which escaped examination.

#### TREATMENT OF THE OPHTHALMOPLEGIAS.

The treatment of the ophthalmoplegias is almost the same, whatever may be the variety, the same cause being possible in the orbit, at the base of the brain, or in the cerebrum ; but as these causes are extremely numerous and varied, the medication should be dictated by the ætiological diagnosis.

As we have seen in the course of this work, the uncertainty of diagnosis and the gravity of the number of affections that may produce paralysis of the oculo-motor nerves, show that the influence of treatment, especially in the nuclear ophthalmoplegias, is chiefly problematic.

However, it is not the less necessary to hope for results, especially in recent paralysis, of which a great number recover even spontaneously, particularly when they are traumatic or specific. All the attention of the physician should, then, be given to the ætiological diagnosis, for on this will depend all the success of his treatment.

If there be syphilis, diabetes, diathesis, or poisoning of any kind, the usual treatment for these affections should be employed and with vigor in proportion to the severity of the disease.

Because an ophthalmoplegia persists, one is not authorized to admit that the primary cause which produced it still exists. In fact, it may be that the muscle ceases to contract when its innervation has suffered during a long period, but its contractility may not have disappeared in an irremediable manner. For this reason we have often obtained excellent effects from electricity employed alone, or with a general specific or diathetic treatment.

Electrical treatment has been recommended by all authors, and I have had excellent results from it. We employ faradization, or galvanization, or both alternately. As early as 1865 Szokalski applied faradic currents to paralyzed ocular muscles. He used an elevator having the convex or the concave side insulated according as he wished to act on the levator or on the muscles of the eye. Gozzini, in 1868, employed faradic currents using a damp forceps as an electrode. One can treat the muscles of the eye directly through the conjunctiva, or indirectly through the lids, or by reflex action through the trigeminal. If alternating currents are used, one should begin with a very weak current and increase it gradually without shock. To avoid shock when increasing or diminishing the intensity of the current, a rheostat should be used in the circuit.

If using continuous currents the application may also be made through the eyelids or directly to the muscle through the conjunctiva. In any case, the intensity of the current should not exceed one or two milliamperes. The indifferent electrode may be placed on the neck and should have a large surface.

The respective values of the ascending and descending currents does not seem well fixed as yet. Benedikt advises applying the anode on the forehead and the cathode around the orbit in the direction of the paralyzed muscle twenty to forty times.

I have obtained very good results, chiefly in paralyses of the external rectus, with faradic currents, using a bipolar electrode of very small surface. By having the patient look forcedly in direction opposite to the paralysis, after having instilled some drops of a 3 or 4 per cent. solution of cocaine, one can act on the anterior extremity of the muscle with quite intense currents without producing notable pain. For electrization of the whole eye I had made, fifteen years ago, a carbon electrode hollowed out to fit over the ocular globe. In this way the pressure is distributed over the whole eye and can be made quite strong without causing the least discomfort. Among other means of

treatment we have the mechanical, the orthopedic, and finally the operative.

As a mechanical treatment, Michel has indicated, in 1877, the following: He picks up the conjunctiva at the scleral insertion of the paralyzed muscle, and draws the bulbus alternately in the direction of the paralyzed muscle and away from it for two minutes, once or twice each day.

The orthopedic treatment appears applicable only to a small number of cases solely when the muscle is paretic. In cases of complete paralysis I do not believe that the will can produce the least useful action.

Some use a prism combined with rotation of the head, while the eyes fix a determined object, in such a way as to obtain fusion of the images. But here again this means is applicable solely where there is paresis, and I believe it should only be used as an adjuvant to the various treatments that I have already indicated.

## OPHTHALMOLOGICAL NOTES.

### BIBLIOGRAPHICAL ANALYSES, BOOKS, AND THESES, MEDICAL MISCELLANY, CURRENT NEWS.

CLINICAL RESEARCHES ON PARALYSES OF THE OCULAR MUSCLES (*Thèse de Paris*).—M. Mello Vianna introduces his work by an exposition of the anatomy of the motor nerves of the eye and presents a clinical and pathological history of ocular paralyses. The chief feature is the attempt to arrange these paralyses into twelve groups according to the facts gathered from thirty-three carefully observed cases. These groups are :

1. Ocular paralyses in progressive locomotor ataxia.—These are very frequent. In Case II., the patient offers a type of *ptosis à bascule* (tremulous ptosis, Dejerine). By this name is designated the fact that some can, after having closed the healthy eye and by making the effort with both together, raise the paralyzed eyelid, and if, at this moment, one begins to lift the paralyzed with the finger, the healthy eye is immediately closed after a series of convulsive twitchings of the orbicularis.

2. Ocular paralyses in syringomyelitis in a case from MM. Charcot and Brissand ; the patient presented a slight diplopia, but M. Vianna publishes the first complete observation.

3. Ocular paralyses in polyneuritis, generally of alcoholic origin but also due to other causes.

4. Ocular paralyses due to toxic causes, alcoholism and saturnism the chief factors.

5. Ocular paralyses due to syphilis.

6. Ocular paralyses consecutive to hemorrhages, cerebral tumors, etc.

7. Ocular paralyses from retardation of nutrition. The author reports only one case, double paralysis of the fourth pair in a gouty subject. At the moment of the appearance of the paralysis,

albumen appeared in the urine, and disappeared with the cure of the ocular trouble.

8. Periodical ocular paralyses accompanying menstruation. To Pflüger's case (1885) the author adds another of this rare form of paralysis, designated by Dufour as "chronic periodical nuclear paralysis."

9. Ocular paralysis consecutive to an affection of the sphenoidal sinus.

10. Ocular paralyses of traumatic form.
11. Congenital ocular paralyses.
12. Ocular paralyses of undetermined causes.

\*  
\* \*

#### DIABETIC AMBLYOPIA.

Professor Ludwig Mauthner gives an interesting *résumé* of the present knowledge of ocular disturbances in diabetes (*La France Médicale*, November and December, 1893).

Ocular troubles relate in a pathogenetic view to the following phenomena :

1. Subtraction of water from the tissues with glycosuria.
2. Diminution of the resistance of the tissues caused by the general disturbance of nutrition.
3. Presence in the blood of a toxic substance which excites degeneration and inflammation.
4. Cachectic troubles.
5. Ocular lesions due to subtraction of water from the tissues with presence of glycose.

We can see now, with some details, that the ocular lesions engendered by these morbid phenomenon are :

1. Hypermetropia. Horner has observed a diabetic patient, of fifty-three years, in whom the hypermetropia increased two dioptries during two weeks, equivalent to a shortening of optical axis amounting to Omm. 6 :

2. So-called diabetic cataract. It is doubtful if the subtraction of water or the presence of glycosuria have an effect on the production of cataract :

3. Ocular lesions due to the general disturbance of nutrition. With lessening of the resistance of the tissues, the walls of the vessels become changed and allow transudation of the red corpuscles. This is not due to a general action ; it depends

upon a direct action of the diabetic toxine and consequently belongs in the following class :

4. Ocular lesions due to the transportation by the blood of a toxic substance which produces degeneration and inflammation. Without contradiction, there exists a direct poisoning which acts on the capillary walls and which may likewise be the cause of diabetic hemorrhages. These may be divided into two groups :

A. Group of intra-orbital hemorrhages. They should be classed as :

1. Hemorrhages of the conjunctiva (very rare) ;
2. Retinal hemorrhages ;
3. Hemorrhages of the choroid in the macular region ;
4. Hemorrhages into the vitreous body and into the anterior chamber coming from the retina and from the choroid ;
5. Hemorrhagic glaucoma ;
6. Detachment of the retina and choroid by effusion of blood ;
7. Sudden loss of vision from atrophy of the nerve, caused without doubt by a hemorrhage into the sheath of the intra-orbital portion of the nerve, which compresses the nerve and produces the atrophy.

B. Group of intracranial hemorrhages. In this case the hemorrhages occur in the fibers from the nuclei of the motor, sensory, or trophic nerves of the eye. Phenomena can be subdivided into :

1. Hemorrhages of the optic nerve (hemianopsia and other forms described by Leber) ;

2. Hemorrhages of the center of color vision. Samelsohn described in 1885 an absolute achromatopsia occurring with sudden invasion. To comprehend this achromatopsia, it is necessary to suppose the existence of a center for color vision in the cerebral cortex, a center which would be suddenly invaded and destroyed by a blood clot.

3. Hemorrhage into the motor nerves. As effects we have :

(a) Paralysis of the accommodation, with or without paralysis of the sphincter ;

(b) Paralysis of the sixth pair.

(c) Total paralysis of the third pair.

(d) Paralysis of the fourth pair.

(e) Paralytic lagophthalmos.

4. Hemorrhages into the sensory or trophic nerves. It is in

this subdivision that we class neuro-paralytic keratitis caused by paralysis of the trigeminal.

The diabetic toxine also produces hemorrhages due to a degenerative action from multiple ocular lesions engendered by local irritation. They are :

- (a) Ophthalmic zona ;
- (b) Phlegmon of the orbit ;
- (c) Abscess of the eyelids ;
- (d) Blepharitis ;
- (e) Furuncles ;
- (f) Episcleritis ;
- (g) A peculiar keratitis differing from neuro-paralytic keratitis ;
- (h) Iritis ;
- (i) Irido-cyclitis ;
- (j) Exudative retinitis ; in particular, punctate central retinitis, characterized by inflammation of the central region of the retina, with a clear center simulating a hemorrhagic spot ;
- (k) Neuritis ;
- (l) Neuro-retinitis ;
- (m) Congestion of the papilla ;
- (n) Retro-bulbar neuritis, leading to atrophy.

The importance of diabetes is not in relation with the quantity nor with the presence of sugar in the urine, but with the presence of specific toxine ; this may be produced at some definite period in such quantity that the nutrition of the blood is not at all altered ; although the toxic product may be deposited in particular organs, as the eye, where it produces inflammations and other local lesions.

Ocular lesions due to the diabetic cachexia :

1. Diabetic cataract.—While the subtraction of water does not seem to produce cataract, it is certain that the diabetic cachexia causes the formation of crystalline troubles. Schweigger and Hirschberg are absolutely of this opinion, and the first author says : “ I comprise under the name of diabetic cataract only those cases in which a double cataract develops rapidly in young persons who are in an advanced period of a recognized diabetes.” Hirschberg says : “ The young people affected by diabetic cataract are those who, for some months, suffer emaciation.” All cases of diabetic cataract in early life, from ten to twenty years, proceed from a state of marasmus. In the more aged persons,

toward fifty, cataract is very rarely produced, but crystalline opacities may appear in both eyes and progress rapidly. It is very evident that we may meet senile cataracts in diabetics, which differ from diabetic cataract in the aged, as cataract in glaucoma differs from glaucomatous cataract.

2. Diminution of the amplitudes of convergence and of accommodation.—When the emaciation of the diabetic affects the muscular forces, accommodation and convergence are affected, but these phenomena are no more pronounced in diabetes than in any other cachexia. Professor Mauthner's study terminates by a general view of cerebral diabetes which often directly produces ocular lesions. It is thus that a pathological alteration of the optic layers will produce constitutional diabetes and at the same time engender a paralysis of the ocular muscles. Seegen cites a case of acute diabetes terminating in death, having as its cause a partial degeneration of the occipital lobe; in this case there was an homonymous diplopia, that had been attributed to the diabetes, but which was really due to the degeneration. Blankaart has seen an intracranial cyst produce diabetes and ocular troubles; Rosenthal found a sarcoma of the hypophysis as a cause of diabetes, the pressure of the same tumor on the optic nerve caused blindness. Seegen met with a tumor in the right half of the medulla which produced diabetes and by pressing on the ocular nuclei caused paralysis. In all these cases the ocular phenomena were due to mechanical causes and not to the diabetes itself.

\*  
\* \*

#### THE INTRA-CEREBRAL VISUAL APPARATUS.

Dr. Vialet (*Annales d'oculistique*, t. cxi., Mars, 1894) has gathered a number of anatomical studies and pathological specimens on which he bases a valuable work of nearly forty pages. As a *résumé* he designs a schematic plate which we reproduce with explanatory notes.

This plate presents in schematic form the different peculiarities of the visual nerve apparatus and its intra-cerebral connections.

All the visual nerve apparatus dependent on the left hemisphere, from the cortex to the retina, as well as the corresponding portion of the visual field, is marked by a deeper tint.

It may be seen that the visual conductors on arrival at the chiasm divide to innervate the temporal half of the retina of the

left eye, and the nasal half of the retina of the right eye. Lesion of these conductors above the chiasm produces homonymous hemianopsia with abolition of vision in the right half of both visual fields.

The portions of the cortex marked by the darkest tint represent the cortical centers. At the posterior part of the hemisphere is found the cortical center of vision, represented by the cuneus (C.), the lingual lobe (L. L.), and the occipital pole (P. O.). The fusiform lobe is not comprised in the section at this height.

The center of visual images of words is situated in the angular gyrus (P. C.) (Kussmaul's center).

The center of auditory images of words is situated in the first and second temporal (L. T.) (Wernicke's center).

The center of articulate language is situated in the third frontal (L. F.) (Broca's center).

The different fasciculi of the anterior segment of the visual nerve apparatus are marked as follows :

||| Direct fasciculus ;

≡ Crossed fasciculus ;

. . . . . Crossed macular fasciculus ;

— - — - — Direct macular fasciculus ;

Figures 1, 2, 3, 4, and 5 represent the respective situation of the fasciculi in the optic nerve, the chiasm and the tract.

Fig. 1. Left optic nerve, at its origin from the ocular globe.

Fig. 2. Optic nerve in its intra-orbital portion.

Fig. 3. Optic nerve in the optic canal.

Fig. 4. Chiasm.

Fig. 5. Left optic tract.

F. D. Direct fasciculus.

F. C. Crossed fasciculus.

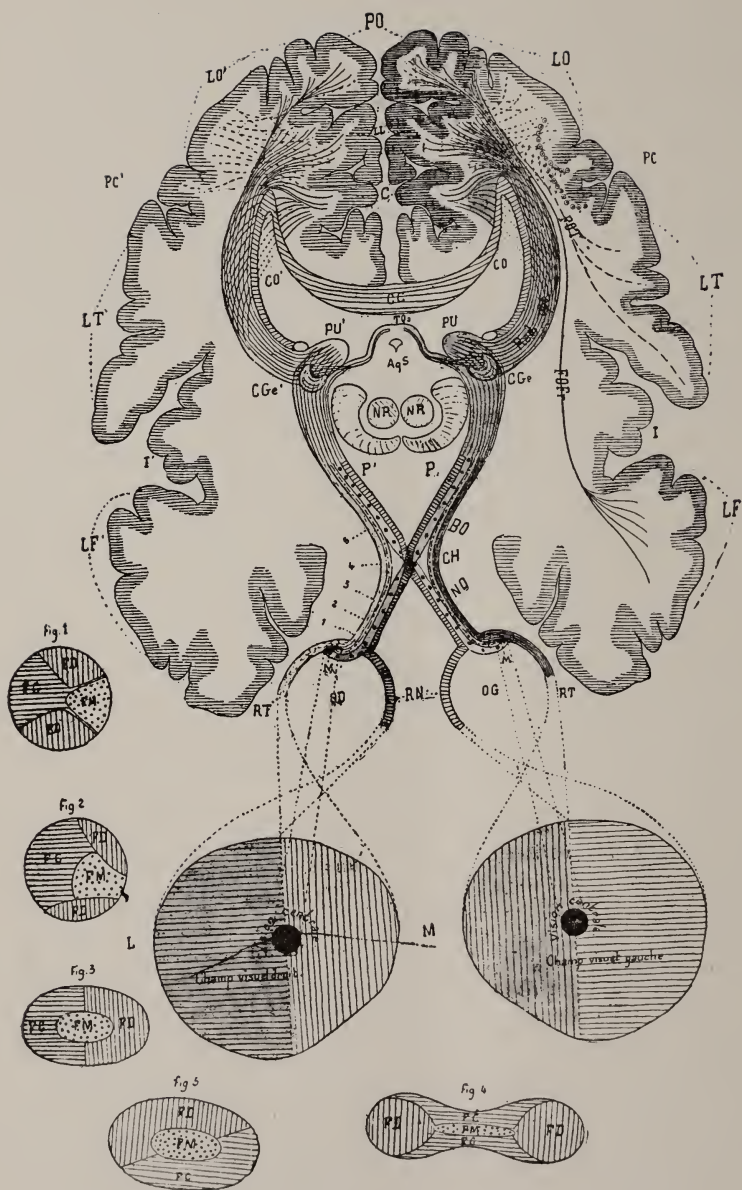
F. M. Macular fasciculus.

The *association* fibers unite the cortical visual center of the left hemisphere to those of the right hemisphere passing through the corpus callosum.

The intra-hemispherical fibers of association are represented by :

————— F. O. Fr. Occipito-frontal fasciculus connecting the visual center with that of articulate language.

————— F. O. T. Occipito-temporal fasciculus connecting the visual center with the center of auditory memory of words.



Interruption of this path of association produces pure verbal blindness (Dejerine and Vialet).

..... Fibers of association between the visual center of perception, situated at the internal face of the occipital lobe, and the center of visual memory, placed at the external face of this lobe. These fibers are represented by several fasciculi, among them the transverse fasciculus of the cuneus (Sachs) and the transverse fasciculus of the lingual lobe (Vialet).

+++++ Association fibers between the visual center of perception and the visual center of words, that is to say, between the external face of the occipital lobe and the angular gyrus.

oooooooooooo Association fibers between the center of visual memory and the center of visual images of words, that is, between the external face of the occipital lobe and the angular gyrus.

Aq. S. Aqueduct of Sylvius.

B. O. Optic tract.

C. Cuneus.

C. C. Corpus Callosum.

C. O. Occipital Cornua.

C. H. Chiasma.

F. O. F. Occipito-frontal fasciculus.

F. O. T. Occipito-temporal fasciculus.

F. C. Crossed fasciculus.

F. D. Direct fasciculus.

F. M. Macular fasciculus.

I. Insula.

L. F. Frontal lobe.

L. L. Lingual lobe.

L. O. Occipital lobe.

N. O. Optic nerve.

N. R. Red nucleus.

N. C. Caudate nucleus.

O. D. Right eye.

O. G. Left eye.

Rad. Opt. Optic radiations.

R. N. Nasal portion of the retina.

R. T. Temporal portion of the retina.

P. U. Pulvinar.

P. Peduncle.

T. Qa. Anterior quadrigeminal tubercle

## BOOK REVIEW.

ESSENTIALS OF DISEASES OF THE EYE, NOSE AND THROAT. Being No. 14 of Saunder's Question-Compends. By EDWARD JACKSON, A. M., M. D., and E. B. GLEASON, S. B., M. D. Second edition, revised ; 124 illustrations. Philadelphia, W. B. Saunders, 925 Walnut Street, 1894.

This little book of 290 pages is a continuation of the excellent series of quiz compends for students issued by this house. The questions and answers cover the methods of examination of the eye, nose, and throat, the anomalies of refraction and accommodation, and the various diseased and anomalous conditions of the organs named ; in addition to which information is given concerning the various drugs and formulæ used in treatment. The volume is well gotten up and should be valuable to the student in the departments covered.

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R Potass. Iodide .....	3i
Cod-Liver Glycerine .....	3iv
Tarax Fl. Ext .....	3ss
Aq. Rose .....	3iss
M. Sig.—Teaspoonful at meals and bedtime	

## For Infantile Diarrhoea.

R Cod Liver Glycerine..... 3ii  
Opil Tr. Camph ..... 3ii  
Mistura Creta, q. s. .... 3iv  
M. Sig.—One-half to one teaspoonful every two hours if  
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## EDITORIAL.

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We are obliged to announce, with much regret, the retirement of Dr. Horace F. Ivins from the staff of the JOURNAL.

The work on "Diseases of the Nose and Throat" recently issued, together with his practice, college work, and the labor on the JOURNAL, has been such a serious drain upon his vitality that he has felt the necessity of reducing the burden, and however reluctant we may be to lose his valuable aid, we cannot but acquiesce in the justice of his decision under the circumstances.

It is a misfortune that the man who is most earnest in the prosecution of intellectual labor is often seriously handicapped by the fact that the nervous temperament, which impels him to work, is the factor in his make-up which limits his physical capacity for the execution of his designs, and he is a wise man who knows when he has reached his limit.

We trust that our colleague may be speedily restored, and shall hope to have the support of his able pen from time to time, as opportunity may arise.

## A STUDY IN LIGHT AND REFRACTION—IV.

BY W. U. REYNOLDS, M. D., O. ET A. CH., NEW YORK.

“ The universe is measured by an eye.”

A perpendicular let fall upon this latter diagonal (the solid line), from the point of crossing of the other diagonals (dotted lines), will be the sine of the angle it forms with the central axis on a radius of half the focal length. This sine is the sixth part of the focal length—the natural unit spoken of. The focal length being 600, this sine is 100. Its cube gives the length and size of a minute ray,  $\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6} = \frac{1}{216}$ ,  $100 \times 100 \times 100 = 1,000,000$ .

Perpendiculars from points on central axis at distances multiple of half the focal length are all corresponding multiples of this primary line. The sine of the ninth multiple, counting from the optical center, indicates the altitude of the solid figure, measuring on the horizontal through the next less multiple distance; also this is the outer limit of the beam. These sines might be suggested as a possible origin of the ten or nine digits, there being no doubt of the antiquity of investigations into the phenomenon of vision.

We will now turn the whole plane  $90^\circ$  around the central axis. It is evident the points of the triangles will project out behind and in front of the central axis, and only the edge of the plane will be presented to view as a straight

line. Leaving it in this position we will suppose another plane at right angles to it, that is, in the position the first originally occupied, and upon this new plane will appear the central axis with its anterior principal focus and the point halfway between optical center and posterior principal focus. Through this point we will draw a line equal in length to the chord, it being in fact a similar line, on the basis that everything behind is equal to everything in front.

The lines of a solid can now be produced of the form of two tetrahedrons or pyramids of equal sides, edges, and altitudes, placed base to base, the plane running through the junction of the bases.

Lines backward from the extremities of the posterior chord to the apex of the triangle in the plane that was turned a quarter circle will be just as long as the chord; so will be a line from the anterior principal focus to the apex; so will be lines connecting the extremities of the chord with the anterior principal focus. On each side the vertical plane will be a solid having four apexes, four sides, and six edges, and the bases will be an equilateral triangle of which the distance from a side to an apex is twice plus one the half focal length, or one and a half times the whole focal length. A line from the center of an edge to an apex; will be the slant height of the solid. A line between the two most distant apexes will be twice the altitude. Turning back now the first plane, we find upon it the triangles, of which the lines in space are all of equal length, but here projected in different lengths. The lines (dotted) from centers of upper edges through point halfway between posterior focus and optical center are the distances between two edges, important distances as will appear later, and their point of intersection is a landmark, but is not the optical center. The optical center should be synonymous with nodal point since every line connecting every point in the object with its image in the picture will pass through it. Such lines will be neither lines of refracted light nor edges of refracted light, or rays, but simply imaginary, abso-

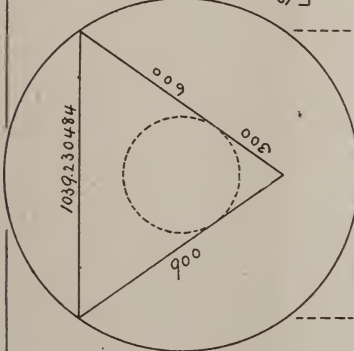
lutely straight, lines of direction solely, secondary axes and axes of light rays.

The lines of these pyramids must change with the width of the source of light and index of refraction or diameter of the atomic ray, or we may say with the length of focus, since that is the final result of all the factors, with a reservation connected with the diameter of an atomic ray to be referred to—the ray which got smaller and smaller as the object was brought near the eye.

The lengths of the edges of these pyramids when projected upon planes—the solids being in different positions—show curious relationship to their actual length, to the width of the lens, to the ray of light, and to the outline of a globe containing them singly and when united.

Take one and lay it flat (see right hand lower projection in Fig. 3), the apex is uppermost and the six edges are in view, three running from apex to base. A circle enclosing a base will be a small circle of the globe that will contain the solid, each of its four points to be in the surface. The radius of this circle will be the length of the principal focus. The projections of the edges running up to apex equal the principal focus. The projections of the slant height equal half the focus. The outside circle is a great circle of the containing globe.

Above this is a projection upon a vertical plane of same position of solid. In this an edge measures three halves of the principal focus, being the same as the slant height. There are four edges in the same position, the fifth is a point in the lower corner, and the sixth is of full size with its ends in the great circle of the containing globe, giving us the center of the pyramid and globe, for lines from an opposite apex perpendicular to each of the sides of the new triangle will pass through it. This contains all the measurements. We can imagine a globe contained in the pyramid with all the four sides just touching it, the centers of all coinciding; the diameter of the small globe will be nearly equal to the diameter of the lens as formed in Fig. 1, for the same focus; the difference when placed on a pro-



AN EDGE UPPERMOST.  
THREE POINTS SEEN  
FROM FRONT OR BACK.

$$\begin{array}{r} 734846922 \\ 519615242 \\ \hline 215231680 \end{array}$$

$\frac{1}{2}(\sqrt{3}) - 1$  OF A RAY  
OF LIGHT.  
RAY IS 432.  
IN LENGTH TO 1  
IN DIAMETER.

215.42086 IS A  
SEMI-DIAMETER OF  
LENS OF 637.5 RADIUS  
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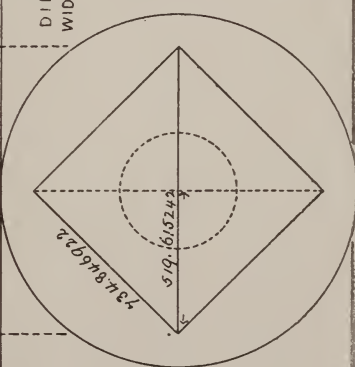
600 FOCUS  
DIFFERENCE FOR WHOLE  
WIDTH OF LENS .378360

FOUR PROJECTIONS  
OF AN EQUILATERAL  
TETRAHEDRON  
CONTAINED IN  
A GLOBE

ALTITUDE

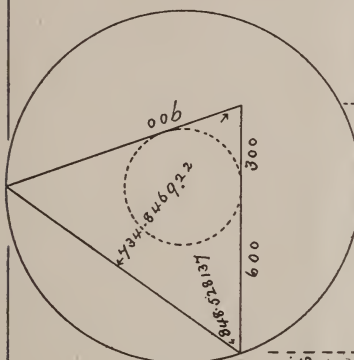
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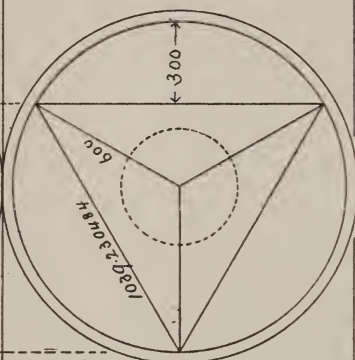


FROM ABOVE OR  
BELOW ONLY TWO  
POINTS SEEN AT ONCE.

FIG. 3



FROM FRONT THREE  
POINTS, FROM BACK  
THREE POINTS.



FROM ABOVE, ONE  
POINT IS VISIBLE.  
FROM BELOW, THREE.

portionate basis corresponding to a ray of light coming from a distance of 2.38 times the principal focus.

The upper left hand projection in Fig. 3, is a projection on a vertical plane of the solid standing on an edge which is at an angle of  $90^\circ$  to the plane. This edge projects into a point. The uppermost edge is projected full size with the ends in a great circle. The other sides are equal to three halves of the focal distance. The same view as the one on right, only turned  $45^\circ$  to the right.

The projection on a horizontal plane of this position is curious in that the slanting visible sides form a square, the diagonals of which equal an edge, full size. If two of the sides of this square are laid down upon the diagonal, the over-lapping will, when two units ( $\frac{1}{3\frac{1}{2}}$  of the focal distance) are added, exactly equal the length of a ray of light, and be less than the width of the lens, as formed in Fig. 1, by .37836 of one six-hundredth of the focal length.

Two of these solids are placed base to base in Fig. 2, the slant height coinciding with the central axis, the double altitude with the horizontal through optical center, the great circles meeting at the anterior and posterior principal foci. The lens will almost fit in between the two centers. The amount of separation lacking is 6.57766.

The combination contracts six contained globe diameters into four (3:2), to a total of 1697.05624. Four lens diameters equal 1723.36688. Making the difference on the width of the molecule 26.31064, which reduced to inches is .02631064. This multiplied by length of a complete ray (432.4) equals 11.376 inches.

A horizontal and a vertical projection of the combination are shown in Fig. 4. The one on the left being the horizontal plane, the eye looking down upon it. This shows the square, containing a circle of the diameter of the contained globe. A line connecting the intersections of the circle with the diagonal will be tangent to a circle whose diameter is half the focal distance. Were the outer circle of the diameter of the lens made as in Fig. 1, this line would not be a tangent to the inner circle.

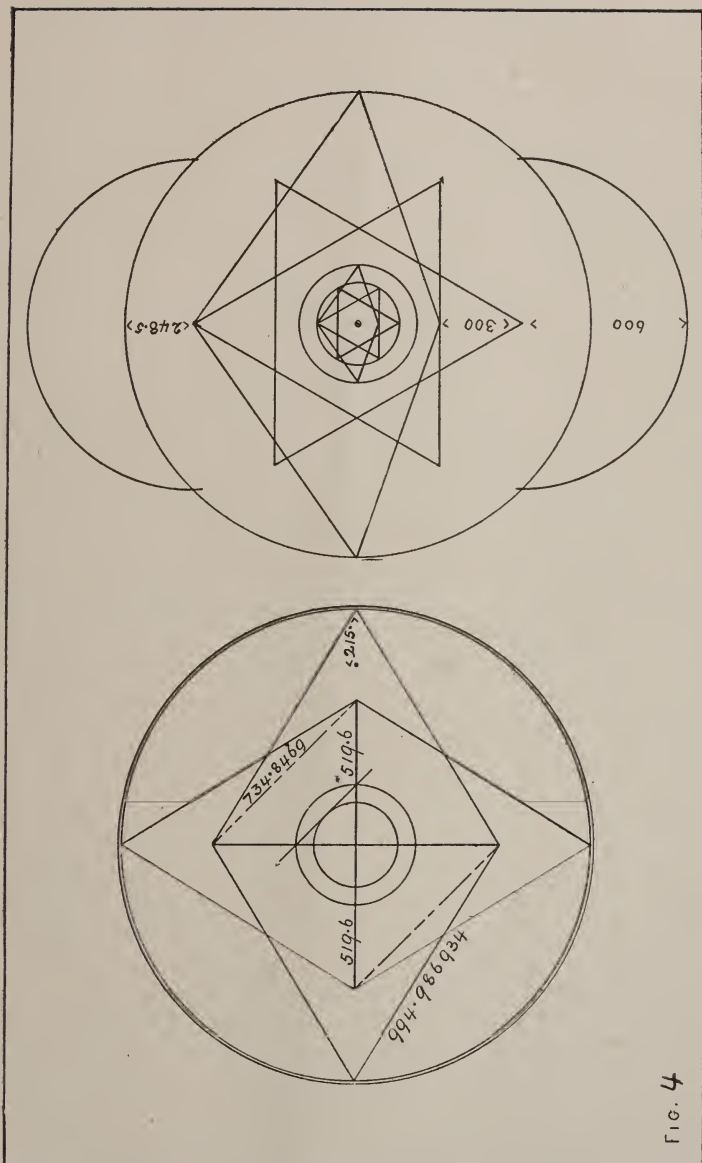


Fig. 4

On the right is a side view with a similar structure in the center.

Let us return to Fig. 2. The molecule is here represented with tangent parallels and horizontal lines drawn at multiples of the principal focus. The line running from posterior principal focus through the edge of lens space represents the radius of curve. If with multiples of this and centers of atoms on both sides as centers, circles are described, the circles will overlap on the horizontal lines in a proportion corresponding to the reduction in the size of the image formed by the lens. Thus at twice focal distance the overlapping equals the lens; at three times, it is twice the lens; at four times it is three times the lens.

The overlapping being always one less than the multiple of the focal distance the horizontal is from the optical center. They also, each on its own side, cut the horizontal a second time at a distance from the intersection of the circle of the opposite side nearly equal to the diameter of the lens, giving us at each horizontal a width corresponding to one more than the multiple of the focus.

At twice focal distance it is three, at four times it is five. These relations of course would continue to any distance. Perhaps we can say this "one more" is connected with the light, and we know the "one less" corresponds to the reduction in size of the picture of object. This arrangement does not, with its ever-increasing width, illustrate what has apparently been found, namely that the parallels limiting the light of a ray run from a distance. Neither what has been said about the edge of object being the center of a circle of light.

An endeavor has been made in Fig. 5 to show these.

Here the centers of what we may term the light circles are made to advance in multiples of half the focal distance along two parallels separated by the width of the lens of Fig. 1.

The radius of each circle is the distance from a point on the horizontal through the optical center measured four half lens-widths from the optical center, each side alike,

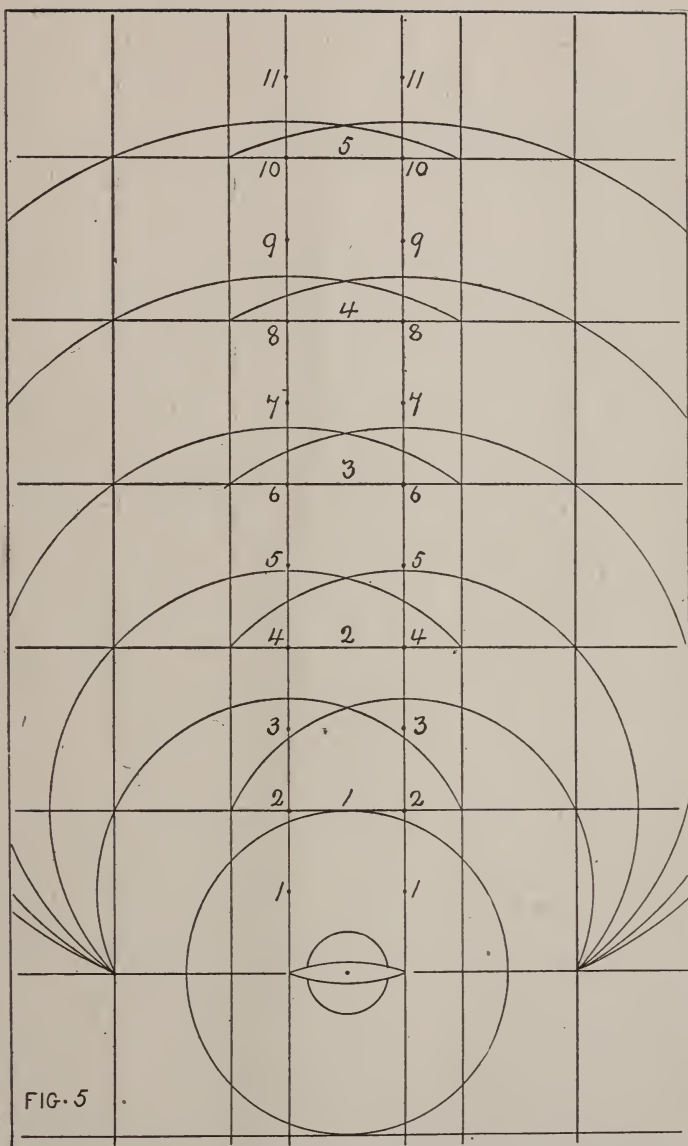


FIG. 5

from this point to the half focal distances on the center parallels. All radii measuring to this point on the zero horizontal.

The circles overlap at each multiple of the whole focal distance an amount twice the width of the lens. And the circles also include on the same horizontal a space equal to four times the diameter of the lens or eight times its radius.

In this way they proceed if the object does not decrease in size, marking out a perfectly straight course, never broader nor narrower, to infinity.

This most closely represents the action of the eye for a single beam.

Measuring on central axis to the intersection of the two circles, the extreme limit of light for an object as wide as the lens is two and a fraction times the distance of object from optical center, the fraction *decreasing* with increase of distance of object.

The circumference of the light circles are four times as many half focal distances from the optical center as the object is whole focal distances. And as we saw in the arrangement of rays in the previous study, each width of ray has a whole one on each side of it at double the distance, making three; and a half one on each side at the place of object, making a width of two.

On the line of the optical center four whole widths of the lens are taken, or eight half widths. None of the circles when produced down to this line will pass below it except after going inside the outermost parallel. Produced down upon the opposite side, however, they would all meet half a lens-width outside the edge of lens, but their influence is not exerted here.

The large circle underneath has a diameter of twice the focal length. The small circle through the lens has a diameter of half the focal length.

The small circle represents the two quarter focal lengths to which everything is proportionate.

To study the mechanism of the decrease in size of image

as the object is removed, the arrangement of diagonals and moving parallels behind the lens is necessary. (See last study.)

When a distance is taken as an infinity there would always remain between the refracting powers for parallel light and this infinity an amount of power requisite to change the parallels into diagonals, in each ray by itself, having their meeting points in the object, were it not that the refraction of the atmosphere so altered the direction of the minute rays that their direction coincides with the required new direction and made additional power unnecessary.

Following this up however we must be aware that still further removing the object, if it is one giving its own light, and no other light making its image on the optical mirror perceptible to the retina, must cause a divergence great enough to require refraction power to overcome it—the elongation of the focus.

This probably is the reason why distant lights at night through this effort of accommodation seem nearer than they really are—about half as far away as in reality. Bearing out the assertions of study No. 1.

Coming up the harbor on a moonless night, the illuminated roof of a prominent building more than a mile from the shore appears to hang directly over it, gradually receding until we are close enough to perceive the buildings on the dock and even then it does not appear to be as far off as it is known to be.

Decreasing the size of the image beyond a certain limit, without a proper adjustment of the optical apparatus, we have seen, causes a multiple image.

This in the eye may not be always because of a crystalizing of the lens, but simply a lack of accommodative power.

It is hoped the pyramids may in some way explain this, especially the rotating movement. It is of course what is known as double refraction, a property possessed by certain crystals, and in them exhibited and controlled by rotating the medium, but in the case of the lens, by simply

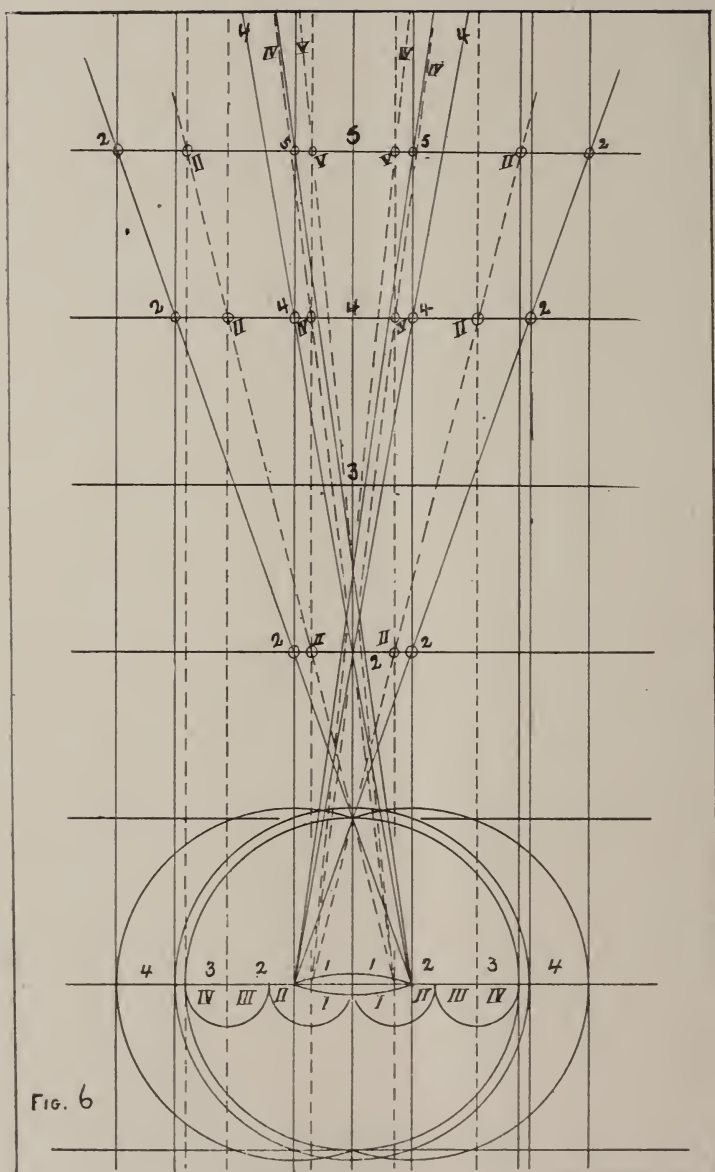


FIG. 6

changing the position of the screen or the size of the object. Crystals do not show it except for small objects.

Some of the relationships of the proportional lines have been shown, but there are still others.

In Figs. 6 and 7, the diagrams are complements, one being an extension of the other, and the proportional lines laid off with horizontals and parallels in the same plane with lines of multiples of the lens' width.

In Fig. 6 are multiples of the half focal distance, four halves or eight quarters, measured below optical center, and the multiples of the lens' width above it. Diagonals are run from edge of the lens and each of the half focal lengths, each diagonal strikes its own proper parallel at the same horizontal distance measured on the central axis, as would follow geometrically.

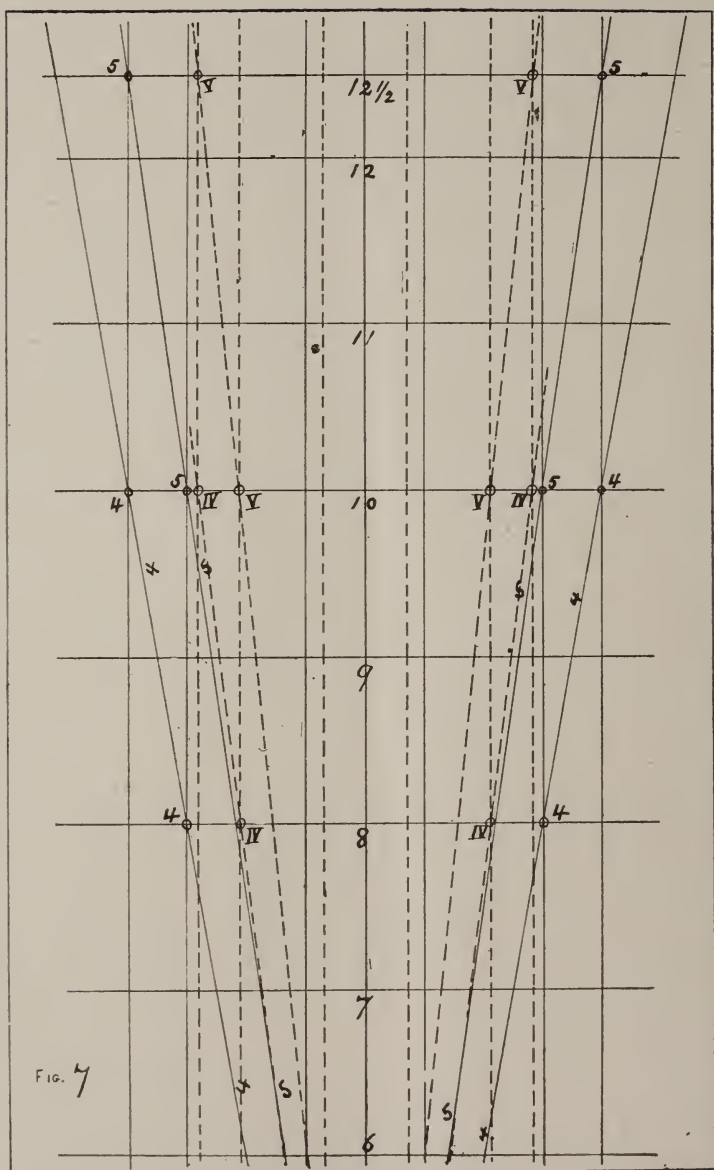
The several diagonals and their intersections are numbered, each system with its own style. They show removals of the object from twice focal distance to four times and to five times.

At twice focal distance for object they cut the outermost parallels at number 5 horizontal as the extreme limit, at four times they both cut the number 10 and at five times they both cut the number  $12\frac{1}{2}$ . Each time it is  $2\frac{1}{2}$  times the distance of object from optical center. It is evident the distance between the parallels can be decreased to any width and the diagonals starting from the same width will reach the outer and also the other corresponding parallels at the same horizontal.

The proportion  $2\frac{1}{2}$  times does not agree so well with the facts ascertained clinically, the fraction over two not decreasing with the distance, as it does in the circle arrangement of No. 5.

In Fig. 8 the endeavor is made to connect the action of the eye with the parallels when looking through the two openings in the parallax meter.

The interposed object outlined by the two openings which cut out parts of the ray, appears just in line with diagonals connecting the extremities of half a focal length



at the zero horizontal with the anterior principal focus and with the outermost proportional parallel's junction with the fifth horizontal.

It would be supposed the overlapping of the disks when the eye is closer to the holes, or when the holes are closer together, is controlled by two agencies,

First, by the limitation of the light by the polarizing angle and the outer edge of opening forming the disk on retina. Thus if the openings are so far separated that this line cannot reach the center of cornea, the disks will appear separated. We know it is not necessary that a passage should be made through the grand optical center for the production of an image, for all but the smallest part of a lens may be covered and an image will be formed at nearly the proper place, but dimmer. There being a multitude of optical centers, one for each minute ray into which we are satisfied the lens automatically divides the light.

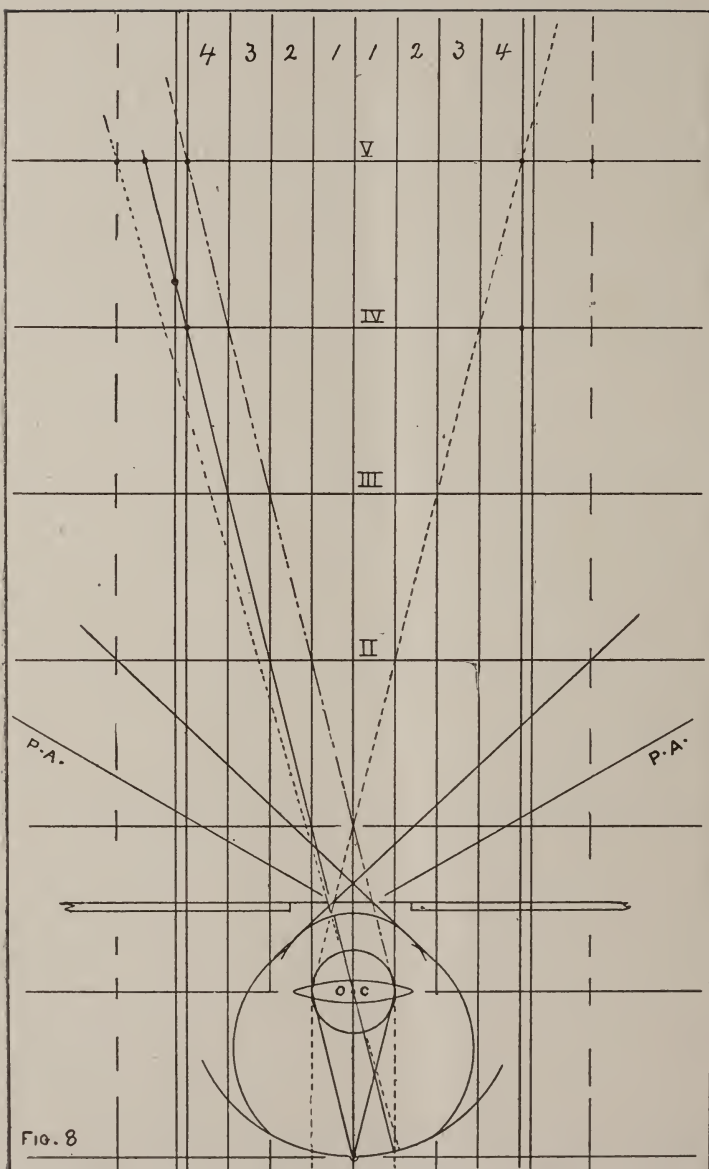
Second, a movement nearer admits light from the opposite side of the central axis from a direction beyond the line through the anterior principal focus and the junction of fifth horizontal with outermost parallel, and the openings not being separated to counteract this, the disks become broad enough to overlap.

There is also another line tangent to curve of cornea, passing through junction of second horizontal and outermost parallel. That junction being a limiting point belonging to this system.

The interposed object could in this way find the place where the edges of openings would be between the two centers of the two sub-rays, the two primary-ray centers.

When one dimension of a ray is reduced one-half, the other dimensions must suffer the same reduction. The outline of the base will inclose one-quarter the area of the first, but the altitude will be one-half, and each side of the area of base will be one-half.

The solid contents are in proportion to the cubes of homologous lines—that is radii, or diameters, or altitudes, etc., and a fraction reducing all lines would be cubed



( $2 \times 2 \times 2 = 8$ ) to represent the proportion to the old solid of the new one on the new lines.

Thus a solid, full-sized ray is reduced to one-eighth volume when all lines in the new ray are one-half similar lines in the old ray.

So one-half the width of the whole number of parallels will represent a reduction to one-eighth volume.

A ray of the diameter of the lens made to be of a diameter equal to half that, will have one-eighth volume.

Should the reduction be made in one dimension only, then that new dimension's relation to the old dimension determines the proportion of volume. See Fig. 1.

In the Fig. 8 the unbroken diagonal line on the left, running through nodal point, cuts the IV horizontal at the outermost parallel, and a fraction further on it cuts the line indicating the radius of curve (the extra unit in accommodation) of the lens surface. A horizontal line through this outermost intersection would indicate on the central axis the same extent of light circle for an object at II as the method used in Fig. 5, of circles about the edges, and the method of rays also.

The system of rays seems to be supported on every hand.

With two small openings in front of a lens and the screen out of focus, two images of a small distant object will be produced and can be made to unite by bringing the openings closer together.

Fig. 9 is intended to show on a plane through principal axis the number of rays and the relation between a single source and the circles of light about it in the atmosphere, there being no other source of light.

Multiplying the object distance by the ratio of the square of the two lines, half chords, upon which the lens is built,  $2.0625 \times 1200$ , gives the distance of outer edge of light circle to agree with that found by drawing circles about the edge of object, 2475.

The tangents to circle of the object at points where a chord through a point halfway between object and lens

would cut it ( $60^\circ$ ), meet the principal axis at same distance as the peripheries of circles about the object end of ray.

Tangents of object circles with edges of lens as centers, at intersection with circles about edges of object, reach central axis a focal length and a little more further off, making a distance of  $2 + \frac{1}{2} + \frac{1}{4.18}$  ( $2.60416\frac{2}{3}$ ) times 1200, measuring on central axis 3125 (for a position of luminous object in which object and image are equal in size).

There is a ray drawn at right angles. When its central part, a width of half a focus, is deducted from the circle the remaining arcs will just contain the width of the lens eight times in each, measuring on the innermost circle. By leaving half a ray's width at each end of the arc the principal ray remains in the center with three whole rays on each side of it.

The representation on paper is, of course, a section in the plane of the principal axis, and represents cross sections of circles of multitudes of intermingled rays.

When a small flame is observed through a very small opening—a needle hole in a card—these circles can be seen to increase and decrease in number as the distance is increased and decreased.

Within the object circle in the figure is seen a square having mathematical relations to the lens' action. The central part of the ray passing through it cuts out a quarter focal length each side the principal axis. The square being two focal lengths wide. This leaves two parallelograms above the horizontal and two below the horizontal through center. Diagonals in different directions through these parallelograms, in each one separately, and from one to the other, form triangles whose parts are similar in measurement and relation to the triangle drawn in upper part of figure. This triangle is well known, its parts are 3, 4, and 5. The parts of one with sides twice as long will be 6, 8, and 10, some of the essential numbers of the combination.

By making an additional tangent from the end of the

radius not generally used and adding another line, marked P, the angular parts are completed.

There are now a number of similar triangles whose sides are in a simple proportion. Some of them as follows:

$$T : S :: R : C \text{ and } T : S :: \text{Sec} : R.$$

Things equal to the same thing are equal to each other, therefore  $\text{Sec} : R :: R : C$ .

If the cosine is the unit,  $R^2 = \text{secant}$ . If the secant is the unit,  $R^2 = \text{cosine}$ .

The curve of the lens is made with the secant or  $R^2$  as a radius.

With the use of the unconventional tangent,  $S^2$  proves equal to the secant — 1, when  $C=1$ . The sine being perpendicular to the radius now extended into the hypotenuse of a right-angled triangle of which the long leg is the radius and the short leg the tangent. Were the angle  $45^\circ$  the two legs would be equal. The sine divides this hypotenuse into two parts and is a mean proportional between them, thus  $C : S :: S : \text{Sec} - C$ , and  $S^2 = \text{Sec} - 1$ . (So in all angles when  $C=1$ .)

In like manner  $P^2$  is proved equal to the product of the segments it makes of the radius.

When a number or line is squared its unit is changed.

P is to the cosine what the sine is to the radius and what the tangent is to the secant, being equal to  $\frac{S}{R}$  and  $\frac{T}{\text{Sec}}$ .

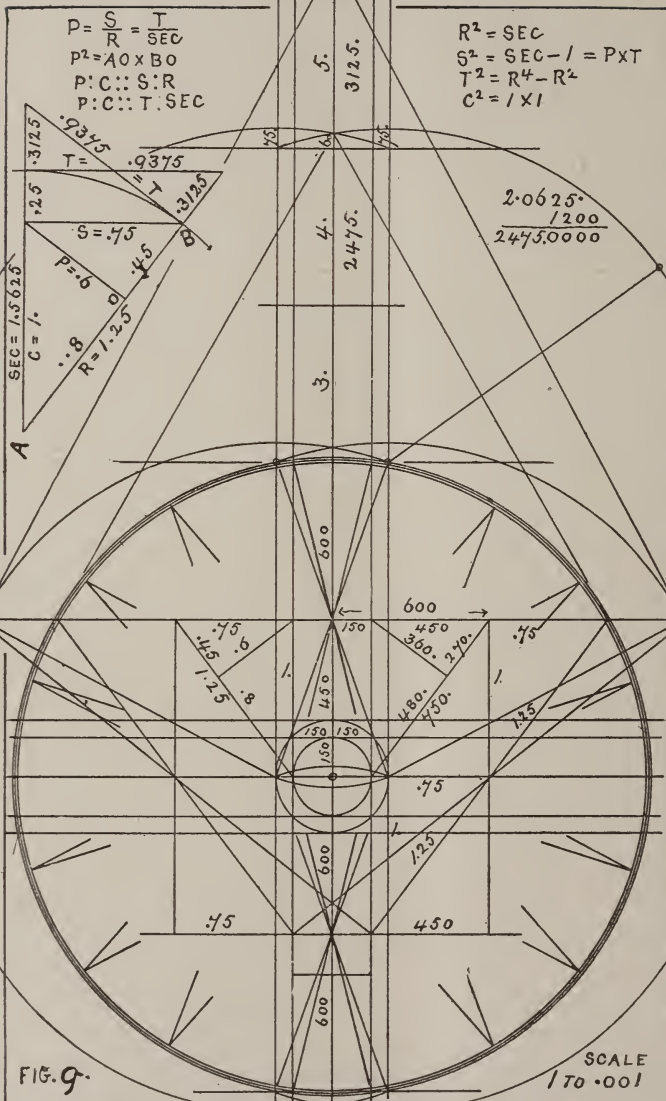
$$T^2 = \text{Sec}^2 - \text{Sec}; \text{ also } = R^4 - R^2.$$

$$\text{Also as } R : C :: T : S, \text{ and } T = S \times R.$$

$$\text{Also } P \times T = \frac{S}{R} \times S \times R = \text{Sec} - 1 = S^2.$$

$$\text{And } R = AO \times R^2, \text{ and } R = AO \times \text{Sec.}, \text{ and } R^2 = S^2 + 1 = \text{Sec}.$$

Tangents can never coincide with the perpendicular or with the secant. The secant in measuring an angle extending into an adjoining quadrant passes over a space in which is the  $90^\circ$  mark. In this space it can have no tangent. It is a space bounded on the sides by the parallel tangents of the diameter, on one end by the diameter and the other by eternity. The secant of an infinite tangent is



equal to  $\sqrt{\infty^2 + R^2}$ . The space between two tangents corresponds to that occupied by a ray of light. An example is seen in the amount of refractive power between  $+1$  and  $-1$  units.

The line  $P$  decreases with the angle and disappears with it. It increases with the angle and would coincide with and be equal to the cosine when the angle is  $90^\circ$ , which cannot occur except the cosine disappears. In this arrangement there is always a cosine equal to the focus, but when the radius remains unchanged  $P$  will disappear with the cosine.

The part of the radius nearest the center divided off by  $P$ , on being multiplied by the secant equals the radius. The value of  $P$  in this triangle, the longest side being the radius and the cosine being unity, is .6. The focal length of this lens is 600, being one thousand times  $P$ . Each of these 600 represents the .001 of an inch. The cosine being 600, brings  $P=360$ . One thousand times this will be the square of 600. Each unit representing the .000001 of an inch.

On the basis of an unchanging cosine, the slightest angle or increase in length of radius over that of cosine makes a secant that is equal to the radius squared, and when the angle reaches  $45^\circ$ , the sine being then equal to the cosine,  $P$  is half the radius, being half the diagonal of a square of which the radius is a whole diagonal. The radius  $= \sqrt{1^2 + 1^2}$  and the secant  $= 1^2 + 1^2 = 2$ , or twice the square of the cosine. ( $R^2 = \text{Sec.}$ )

$R = \sqrt{1+1} = \sqrt{2}$ .  $\text{Sec} = 1+1 = 2$ .  $P = \frac{1}{2}\sqrt{2}$ . Contained in this combination is the paradox of a line or number being equal to its own square.

If we represent by lines the powers of a number, the first power being the line, the second power, twice as long a line, the third power, three times as long a line, on the logarithmic plan, the radius would be represented by a line one-half as long as four focal lengths, and the secant by a line equal to four focal lengths. This is the result in the arrangement presented.

For the radii of the three circles upon which the so-called lens is arranged are so related that the radius of the outer circle, a secant, equals the square of the radius of the middle circle, and the radius of the middle circle, another secant, equals the square of the radius of the inner circle, the focus. The focus is therefore the fourth root of the light or lens curve radius, and the light or lens curve radius equals the fourth power of the focus, and the middle or object circle radius equals the second power of the focus.

The representation by lines places the radius of the object circle in equality with the tangent squared, for, as shown previously,  $T^2 = R^4 - R^2 = \text{Sec}^2 - \text{Sec}$ , making it half as long as the radius of the light circle.

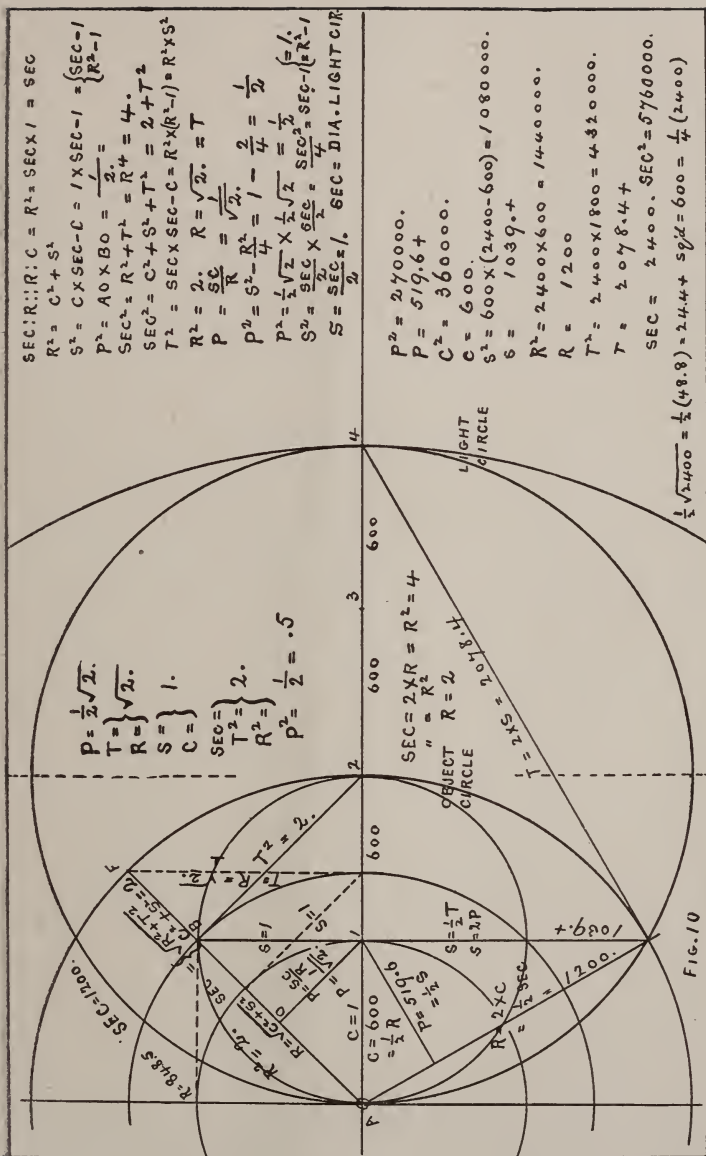
If in the above equation we substitute the values of the figure 5, the long side of the triangle, representing the radius of the light circle, we will have  $T^2 = 625 - 25 = 600$ . Also if the 5 is  $\div 10$ , making a radius of  $.5 = \frac{1}{2}$ , we will have  $T^2 = .625 - .25 = .600$ .

The light radiated into the atmosphere, coming from a distance greater than that of the object and being of a different nature, would have a shorter focus, and diverging again after passing through that focus would reach the screen or retina diffused or attenuated or otherwise altered, producing a condition of semi-darkness, and this focus is apparently a little more than half the length of that of the object (?).

Dividing the light circle into rays, the secondary axes would pass through the optical center just as those of the object do, and the diagonals of each light ray would intersect in object as though the light came from mathematical points in it. This obviates the question as to the breadth of an optical point, and may help to determine its size for each focal length.

In the unit triangle the difference between the secant and radius is .3125, and in the diagram the greatest distance measured on the principal axis is 3125.

Considering the optical center to be now coincident with the periphery of a circle, there being no angle, radius equals



cosine, and all being parallel, the existence of a large triangle on each side the principal axis is suggested—similar in construction to the unit triangle, but with parts 1000 times greater.

There are 1,296,000 seconds in a circumference. There are 206,265 seconds in the part equal to a radius ( $\frac{1,296,000}{3.14159 \times 2}$ ).

$\frac{R^2}{D^2}$  (see Fig. 1) = 2.0625. Add to this .00015 and the sum is 2.06265, or the number of seconds in the part of a circumference equal to a one hundred-thousandth of a radius.

The logarithmic number corresponding to the secant of the unit triangle is 36.51, very nearly the degrees of the angle.

To facilitate comparison the values and squares of the parts of the triangle are here given, also a similar table for a similar triangle whose radius is unity. There is a peculiarity in the P of one becoming the sine of the other.

In every triangle the line P is parallel to one tangent and the sine to the other tangent.

COSINE=UNITY.		RADIUS=UNITY.	
C=1.	C <sup>2</sup> =1.	R=1.	R <sup>2</sup> =1.
R=1.25	R <sup>2</sup> =1.5625	C=.8	C <sup>2</sup> =.64
S=.75	S <sup>2</sup> =.5625	S=.6	S <sup>2</sup> =.36
T=.9375	T <sup>2</sup> =.87890625	T=.75	T <sup>2</sup> =.5625
Sec=1.5625	Sec <sup>2</sup> =2.44140625	Sec <sup>2</sup> =1.25	Sec <sup>2</sup> =1.5625
P=.6	P <sup>2</sup> =.36	P=.48	P <sup>2</sup> =.2304
Vs=.25	Vs <sup>2</sup> =.0625	Vs=.2	Vs <sup>2</sup> =.04
Sec-R=.3125	Sq=.09765625	Sec-R=.25	Sq=.0625
Ao=.8	Ao <sup>2</sup> =.64	Ao=.64	Ao <sup>2</sup> =.4096
Bo=.45	Bo <sup>2</sup> =.2025	Bo=.36	Bo <sup>2</sup> =.1296
Sides of tangent triangles.		Sides of tangent triangles.	
.3125 } Sum		.25 } Sum	
.41666 $\frac{2}{3}$ } =R		.3333 $\frac{1}{3}$ } =R	
.52083 $\frac{1}{3}$ } =1.25		.41666 $\frac{2}{3}$ } =1.	

It must be further noticed that this angle produces a tangent which is three times the length of the difference between the radius and secant.

Also that the two tangents in crossing produce two right-

angled triangles similar to the large one. Their sides are consequently in the same proportionate lengths.

Also it must be noticed that the long side doubled, 1.0416 $\frac{2}{3}$  is but a trifle longer than a thousandth part of the chord, 1039.23, obtained by the intersection of the two circles with a radius of 600. (See Fig. 3.)

Also  $10^{2.5} - 10^2 = 216.2277$ . Also  $8\frac{2}{3} = 4$ , and  $4\frac{2}{3} = 8$ .

The square root of a number equals  $2 \times$  the square root of  $\frac{1}{4}$  the number; thus:  $\sqrt{1.} = 2 \times \sqrt{.25}$ ; and  $\sqrt{8.} = 2 \times \sqrt{2.}$ ; and  $\sqrt{2.} = 4 \times \sqrt{.125}$ ; and  $\sqrt{2.} = 2 \times \sqrt{.5}$ ; and  $\sqrt{.5} = 2 \times \sqrt{.125}$ ; and  $\sqrt{2.} = \frac{1}{2} \times \sqrt{8.}$ ; and  $\sqrt{.5} = .7071068+$ ; and  $\sqrt{2.} = 1.4142136+$ ; and  $\sqrt{8.} = 2.8284272+$ ; and  $\sqrt{2.5} = 1.5811388+$ . Finally, the square of half the square root of a number equals one-quarter the number; *e. g.*,  $(\frac{1}{2}\sqrt{2.})^2 = .5$  and  $(\frac{1}{2}\sqrt{10.})^2 = 2.5$ . The  $\sqrt{10.} = 3.162277+ = \frac{10^{2.5}}{100}$ .

The so-called lens formed herein is understood to correspond to the action of refraction itself, since a simple opening without interposed media produces a result similar to that by a glass lens.

It is hoped that by these studies novel principles may be helped forward and perhaps established. Some of them are:

The connection between the angularity of light and a lens and the eye.

A new method of calculating the length of focus and size of image.

The placing of the action of a lens upon a new geometrical and mathematical basis, that is, upon the properties of a ray of light.

The probability of the action of an eye or lens and a ray of light being the basis of all mathematics.

A clew to the explanation of the spectroscope.

A method of determining the parallax or angularity of the sunlight, and from this developing a principle of nature.

An exposition of the wave theory of light, showing it to be fallacious, because dependent upon the refraction medium or length of focus, or width of ray or opening.

The refraction by the atmosphere of the sun's light to be

similar to that by a lens contracting and condensing the light toward a central perpendicular, producing intenser light and heat.

The divisibility of light into rays having an exact mathematical relation between their length and width or diameter, be the rays great or little.

The antiquity of the subject, as well as its immensity, is evident.

*:(To be continued.)*

## AURAL MASSAGE.

BY HENRY C. HOUGHTON, M. D., NEW YORK.

Aural massage is to the ear what general massage is to the body. As this decade closes this century, one expects to find in the Century Dictionary the concentrated wisdom of the age; hence, "Massage.—The act or art of applying intermittent pressure and strain to the muscles and other accessible tissue of the patient. The means employed are rubbing, kneading, and light pounding, combined ordinarily with more or less additional stimulation of the skin, as by friction and slapping. This manipulation furthers the removal of lymph from the parts, which is specially needful when the lymphatic flow is sluggish through lack of muscular exercise; it apparently quickens the blood circulation through the part, and furnishes gentle vasomotor exercise; it acts possibly as a direct trophic stimulus to muscular and sustentacular tissues; by stretching ligamentous structures it maintains or increases suppleness; in the abdomen it stimulates peristalsis; and as a general stimulation of sensory nerves it may affect favorably the nutrition of the central nervous system. It is represented by the customs of many primitive peoples; and in a developed form constitutes a valuable resource of modern scientific therapeutics."

The foregoing is more than a definition. It reads like an expression based on experience as well as observation. As a summary it is admirable; possibly any attempt to amplify may result in increase of words without added wisdom.

*History.*—The term is derived directly from the French *masser*, to knead as dough. Some writers trace the origin through Latin sources, *massa*, putty, or Greek, to squeeze as dough, back to Arabic root *mass'h*, to press softly. The art is as old as surgery, the methods as varied and original as the races of man. Chinese writing as old as 3000 B. C. describe their operations. The Romans used it in connection with baths, and the Greeks were well versed in manipulations that developed the beauty and conserved the power of the human body. The lomi-lomi practiced by the natives of the Sandwich Islands, and a similar method as observed among the natives of India on the advent of the English, are refinements of grosser forms of the same thing known to the aborigines of America. Like all native instinctive efforts in natural medicine and surgery, these suggestions have been accepted and evolved to higher forms and a wider range of application.

In discussing this subject one must keep to the limits fixed by definition. Massage is not gymnastics, it is not mere passive exercise, nor is it the Swedish movement cure; much less is it shampooing or rubbing. While it is true that Ling, the father of the Swedish movement cure, like Monroe of Boston, was a self-taught operator, as Zander and George H. Taylor of our city were wise followers in mechanical lines, yet we must insist that massage is not a matter which any old-time nurse may take up to eke out an existence. Knowledge of anatomy must be followed by intelligent training to develop a skillful operator; indeed, one must be more than scientific. Massage is an art. Some practice it who had been in a more suitable sphere had they been blacksmiths.

*Effects on the Body.*—Massage has been the subject of a sufficiently long and careful scientific study for one to be able to state conclusions. Authorities agree, in the main, as to physiological results. Without drawing too fine shades of distinction, we may say the circulation is increased, the temperature reduced, the respiration increased, distractive metamorphosis increased; hence secretions are modified

and excretions increased, the general result being improved appetite, physical vigor, and mental force. In some details deviation from this general statement may be observed, special manipulations for local conditions being exceptions. In pathological conditions skill in manipulation, joined with experience, is necessary that the diseased subject may not be carried to a "crisis" by injudicious treatment. Exudations that are absorbed under proper manipulations may become inflammatory centers under unwise, excessive excitation; soreness developed by forceful treatment must be overcome by soothing alleviation. But a limit is here reached. The purpose in view was to touch on general massage only to enforce the deductions to be drawn regarding local massage.

The physiology of audition is discussed under three general divisions: Reception, Conduction, Perception; and the anatomy of the ear favors such a division in study. The external ear and auditory canal fulfill the function of reception, of collection, and synthesis of sounds; it brings all the multiple vibrations of life to the drumhead as an harmonious whole. The auricle is free upon the aponeurosis of the scalp, the degree of perfection of beauty being a suggestion of fullness of auditory function; each elevation, each valley, is essential to the synthesis of sound waves.

The membrana tympani is to be considered with the drum cavity, as it is the external wall of the same, but we judge it is far more than a drumhead. In the form of a cone, apex inward, it is to audition what the cornea, apex outward, is to vision; and as any ulcer causing a facet is fatal to the perfection of vision, so any adhesion or exudation which modifies the contour of the membrana tympani interferes with the perfect symmetry of audition. The part which the membrana tympani plays in audition is not so much that of a diaphragm, which moves to and fro with a piston-like motion, carrying with it the chain of ossicles as a whole, but it stands rather as the iris before the lens, subject to every shade of molecular disturbance of the conducting ether, and, hence, every part of its surface, from

umbo to periphery, from floor of canal to Shrapnell's membrane, is subject to, and becomes a conductor of, molecular disturbances, which are conveyed through a chain of bones to the fenestra ovalis, and through the contained air of the tympanum to the fenestra rotundum. It must be admitted that this offers the best theoretical explanation of function, which, to be perfect, must convey the infinite variety and coloring of sound with which every perfect ear is charged, and the perfection of which staggers our imagination. The cavity of the middle ear is fitted to fulfill this function of conduction, from the fact that it contains a series of levers,—the malleus, incus, and stapes,—suspended in equipose in a closed cavity filled with air, which contained air is adjusted to perfection by exit or ingress through the eustachian tube. The internal ear or labyrinth has been considered as the perceptive portion of the apparatus. So far as the relation of the terminal filaments of the auditory nerve are considered, this is undoubtedly true, but between foramen ovale and foramen rotundum and these terminal filaments there is a gap, which would remain unfilled if we held to old ideas. The function of conduction must be carried a step farther. The contained fluids of the vestibule, saccule, utricle, and semicircular canals must necessarily convey modified vibrations, which make their final impression upon the mechanism, in connection with which the auditory terminals are in relation, either in the ampulla of the semicircular canals on the one hand, or the basement membrane of Corti's organ in the cochlea. Excuse this elementary discussion of anatomy, as it is essential to our present purpose.

Turning, then, to the pathology, anything which causes rigidity of auricle, of drumhead, of ossicula, causes a lessened mobility at the oval or round window, and a diminished impression upon vestibule and scala tympani of the cochlea. Such is the direct and almost immediate result of catarrhal diseases, and, I may say, of so-called arthritic diseases. The immediate relation of these two in diseases of the middle ear is manifest upon the articulations of the

bones. The hypertrophic condition of chronic and sub-acute catarrh is followed by a more serious condition of pseudo-ankylosis, which destroys the mobility of the parts, and reduces audition to bone conduction, practically.

Reverting to the results which we saw obtained in the practice of general massage, any method of manipulation which shall do locally what general massage does for the body would seem to be the desideratum for the above-described condition. This has been the Eldorado of the aurist. A careful study of the literature of the subject will be interesting, as it illustrates the mechanical versatility of the aurists of the world. The Siegle otoscope, the adaptation of stomach pumps, the piston of Delstanché, the tragus presser of Hommel, were efforts in the same direction. A number of years since I besought the aid of Dr. George H. Taylor, the father of mechanical massage, in the selection of a local massage for the ear, but, beyond a thorough massage of the auricle and sides of the head, nothing satisfactory was effected. Since the introduction of the devices of Drs. Maloney and Garey,—Dr. Maloney in 1887, and Dr. Garey in 1892,—the professional atmosphere has rained instruments for evolving vibratory force. The most widely known instruments are the phonograph, the vibrometer, the violin-vibrophone, and various adaptations of musical instruments and vibrating diaphragms in connection with a current of electricity. As the result of a quite extensive study and experimentation, the conclusion reached is to the following effect: Any vibration conveyed to the drum-head, by means of a column of air isolated by the stethoscope, produces upon the canal, drumhead, tympanum, labyrinth, and entire head oscillations of the length and force of those produced by the instrument employed. The immediate effects are increase of circulation, heat, an itching sensation in the canal, tympanum, or even in the eustachian tube; upon the sensorium a benumbing or overpowering impression, such as is produced by powerful sounds upon a person with good hearing, or, for analogy's sake, such as is produced by powerful light upon a person

having good vision ; modification of the subjective noises, when they exist in any case. In some cases nausea, headache, and a disagreeable tension or pressure in the occiput or upper cervical region similar to that which is known as "eye strain." The secondary effects are increase of secretion in the canal, exfoliation of the dermoid layer of the canal and drumhead, increased mobility of the drumhead, increased secretion of the mucous membrane of the head, and modification of the subjective noises between intervals of treatment. In some cases I have been forced to the conclusion that the treatment increased the subjective noises in the interval of treatment ; or, if not increased, they were modified, so that the new noise was of greater annoyance to the patient than the former noise, to which he had become somewhat accustomed. These cases, however, are exceptional, and due to a want of comprehension on the part of the patient, and hence an error in judgment on the part of the operator, which widened experience on the part of both patient and aurist will undoubtedly avoid.

An experience of  $2\frac{1}{2}$  years with the phonograph, vibrometer, organ, and telephonic diaphragms enables one to draw certain conclusions :

1. Tinnitus aurium is modified directly in all cases, but the anticipations of the projectors of this treatment have not been realized. The great majority of cases reporting simply modification are not abolition of this distressing symptom. In some cases one treatment has abolished the subjective sounds at once and permanently ; in other cases the subjective noise has remained the same, but the hearing distance for watch or voice has increased ; in still other cases the subjective sound has been modified or decreased, and the audition not improved.

2. The cases in which the treatment has been of greatest service are those in which difficult hearing followed acute disease, the massage apparently restoring the mobility of the parts ; or cases of chronic catarrhal inflammation, with adenoid processes in the pharynx, and hypertrophic conditions of the tympanum, absorption undoubtedly taking

place as the result of the excitation, and a better condition of the eustachian tube and mucous membrane being the result.

3. The cases in which failure or discouragement on the part of the patient to maintain the treatment sufficiently long to reach a conclusion were those of the well-recognized, remote results of catarrhal disease, called *proliferous* by Roosa, and *sclerotic* by the continental writers. In these cases there is little or no improvement from a brief period of treatment, either as regards the subjective sounds or the audition.

4. The conviction is reached that the powerful application of massage by the instruments producing irregular sounds is prejudicial, except, it may be, in long-standing proliferous cases. The best results are obtained by carefully graded irregular vibrations (noises) and regular vibrations (musical tones) for a brief period, at frequent intervals, in conjunction with the best modern methods of local treatment.

*Means of Massage.*—The instruments best adapted to these purposes, in my judgment, are the phonograph, with cylinders adjusted for the production of irregular sounds (noises) or musical tones—military marches, songs, and so forth; some form of musical instrument,—violin, guitar, or organ,—for regular vibration; and vibrating diaphragms for irregular sounds (noises), as produced by the telephone. In order to secure complete function instruments must be used producing a great range of tone, both as regards rapidity of vibration and quality of tone—as wide as the function of audition itself.

## NASAL POLYPUS.\*

BY FRED D. LEWIS, M. D., BUFFALO, N. Y.

The importance of removing obstructions in the upper respiratory tract, and thereby relieving the patient of distressing reflex symptoms produced by them, is to-day occupying the attention of laryngologists to a greater extent than any other branch of this specialty. There is scarcely a medical journal received that does not contain one or more contributions relative to this very important subject. And it is probable that in no part of the body do we find reflexes so easily excited as in the respiratory tract. These reflexes are of various kinds, as aphonia, chorea, epilepsy, neurasthenia, photophobia with conjunctivitis, asthenopia, heterophoria, etc. Even glaucoma and exophthalmic goitre have been reported cured by nasal operation, and, in my opinion, a very large proportion of all cases of asthma are due to nasal obstruction. Perhaps the first mention made of operation for relieving nasal obstruction is an account of several cases of nasal polypi by Hippocrates, who removed them by rapidly and forcibly drawing a sponge attached to a string through the nasal cavities from behind forward.

This is but one of several forms of neoplasms, any one of which has been dwelt upon to considerable extent by far more able writers than myself. I wish, however, to report a peculiar case that recently came under my care.

Mrs. B. came to me, August 1, from her family phy-

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sician, Dr. A. R. Wright, who suspected some nasal trouble, Symptoms: Frequent closure of left nostril, especially at night. In consequence had lost considerable flesh from loss of sleep and anxiety. Naturally of a high-strung, nervous disposition, but one year married, the thought of grave difficulties of various kinds had prayed on her mind. She had little discharge from the nose, a great deal of sneezing, sense of taste and smell much impaired, no headache. In fact, as she expressed it, the only symptom she could give was that she caught cold very easily on the least exposure to night air or dampness. The bridge of the nose was very high and the nostrils narrow. An anterior examination brought to light only a slight hypertrophic condition of the membranes. With the rhinoscopic mirror, however, a growth was discovered in the left post-nasal space about the size of a bean. With a bent probe, having its point protected with cotton, I found it was easily movable, which fact, with its color—a pearly white—and consistency, decided me in diagnosing it as a polypus with its attachment on the posterior border of the middle turbinated; the most frequent origin of these growths being the anterior border of the middle turbinated, rarely the septum, and very exceptionally the posterior border of the middle turbinated. After a thorough application of four per cent. solution of cocaine anteriorly and posteriorly, I succeeded in engaging the dependent portion of the growth in the wire loop, using a Bosworth snare with curved point, and working by reflection in the rhinoscopic mirror. Having the wire firmly fixed, I used gentle traction and was as much surprised as was my patient when I drew forth a polypus such as is represented by the accompanying photograph. This may slightly exaggerate it, as myxomatous growths such as this absorb moisture, and this was kept in moist cotton for fully two hours before I could have it photographed. Also, being relieved from the compression of the nasal cavity, it had a chance to expand. The attachment evidently was on the upper anterior surface of the middle turbinated, on which it had extended backward

as on a shelf until it dropped over the posterior edge. The turbinated itself concealed it when an anterior examination was made. Larger polypi have been reported, but this is by all odds the largest that has ever come within my



practice, the length being  $2\frac{1}{2}$  inches, the upper white line on the photograph being part of the pin to hold it on the card, and the two lower white lines the remnants of the snare wire.

I might here enter into a long discussion of the etiology of nasal polypus, giving the theories of the various authors, but, as there is such a variety of opinion, I think we may safely conclude that they are but theories, the actual cause being unknown: my own idea being that they result from a chronic inflammation of the Schneiderian membrane.

I can offer nothing new as to treatment. I have repeatedly tried remedies carefully selected and prescribed, but have had no success except by thorough removal. But what I wish particularly to bring out is the importance of relieving any obstructions that may be causing distressing reflexes; my patient up to date showing a very much improved mental and physical condition since the operation. Her meals are relished, and she has gained five or six pounds in weight.

## OPHTHALMIC NOTES.

BY W. A. PHILLIPS, M. D., CLEVELAND, O.

To those who are deeply interested in ophthalmology as an art it is not only highly entertaining but instructive to observe the actual methods practiced by different experts in their clinical work. One may not reproach himself for not feeling under obligations to adopt all he sees and hears that smacks of improvement ; but he should not fail to fairly consider innovations to determine whether or not they can be turned to account as hints in the direction of solid advance.

We are all familiar with the struggle the profession has had with cataract, for instance, and how even to this day there are important points to be settled. But for a bold, triumphant leap over all real and imagined difficulties that hang about the skirts of hard and soft cataracts a certain Paris operator has adopted a style that calls to mind "John Gilpin's Ride." Theoretically, it is without doubt the ideal operation ; whether or not as much can be said of it practically, statistics must prove. I saw him extract six cataracts in twenty-five minutes ; and had the cases been arranged side by side I have no doubt but that the whole number would have been removed in less than five minutes. It was an example of the most consummate dexterity that it has ever been my fortune to witness. The only instrument used was a narrow-bladed knife. The lids were held open by the fingers, the capsule cut through with the knife, when the counter-puncture was quickly made, and the lens pressed out with the back of the blade—all in about a quarter of a minute ! Of these cases all were hard cataracts

except one; but in this he made no apparent change in manipulation, not even modifying the corneal section. Both eyes were afterward covered with an abundance of cotton wool, snugly bandaged, and the patients led away. There was prolapse of the iris in one case; but it was carefully stroked back with a spatula and seemed very well content to remain corrected. A prominent New York oculist was present at the performance, and we unanimously agreed that it was all very beautiful as an exhibition of manual skill, but it could hardly be said to bear the earmarks of the most safe procedure. But opinions don't count alongside of experience unless they coincide, and we await the outcome of this continued brilliancy in the becoming attitude of suspense. The same operator made an exceedingly neat operation on a bad case of convergent squint by advancing the external rectus and carefully dividing the internal. About two lines of divergence were secured to counteract the final sagging back of the advanced muscle. The operated eye alone was bandaged, and this was to be continued the following day only. The stitches were to remain a week or ten days.

In marked contrast to the above I saw both in Paris and in London by distinguished members of the guild something like good old-fashioned von Graefe extractions—a peripheral, linear section with conjunctival flap and *blood*; an iridectomy, laceration of the capsule with a pricker, and the lens very slowly pressed out; all of which was a charming preparation to serve as an appetizer for the sessions of the *International Ophthalmological Congress*, which convened August 7 in Edinburgh. Here was meat for a Cæsar to feed upon, and I fasted for the feast, and—well, the congress is supposed to meet again in five or six years in Holland! Still, it was a pleasure to be here even if little or nothing new was presented, or nothing old in dispute was conclusively settled. It was a pleasure to see so many illustrious men together who have done grand work in ophthalmology, and who will help old Father Time to fill a gap in the list of his immortal worthies.

The question of iridectomy in conjunction with extraction of cataract was deemed a most important topic; but the testimony in the congress showed that it is still on the "anxious seat," and seems as far from gaining unanimity of opinion as it was when first seriously discussed. Nothing was said respecting preliminary iridectomy except in connection with maturation of immature cataracts.

The general conviction of the members was not apparent, although there seemed to prevail a sentiment that a small iridectomy made previously or at the time of the extraction is *safer*; and that the resulting coloboma cosmetically and optically is no substantial objection to the operation, as compared with any degree of safety, however slight. One member who operates without iridectomy uses atropine before and after extraction in preference to eserine. Hastening the maturation of senile cataracts with or without iridectomy, preferably with, was both advocated and opposed. The observer who had probably practiced the hurrying-up process the most frequently was very sanguine that the practice will grow in favor in proportion to experience; and this, too, in spite of his statistics showing that he had over thirty per cent. of cases of iritis! Accordingly a little breeze sprung up on the subject of removing immature cataracts, which are so exceedingly slow in their progress as to be very embarrassing, to say the least. A man of wide experience, and a long one, too, informed the assembly that he did not hesitate to make a large incision and remove slowly developing cataracts even when he could see the fundus oculi with the ophthalmoscope, and he didn't consider it hazardous, either. This brought a young man to his feet who regarded such a course dangerous, as it was often very difficult, if not impossible, to remove all of the lens substance, and if it became crowded into the angle produced in part by the circumference of the iris, iridocyclitis was likely to result. It appeared to be the impression, for the most part, that it is quite as safe to remove immature cataracts as to rub their fur the wrong way.

The cross-legged eye with its monocular and binocular

and cosmetic shortcomings was not forgotten, and came in for its share of target practice. The Paris contingent stood decidedly in favor of advancement in all cases and only occasionally dividing the opposing muscle. The American representatives regarded advancement as necessary only in cases of high grade. Still, it was generally conceded that the principles laid down by von Graefe demand modification. Division, partial or complete, for insufficiency was not mentioned. So it turns up even in this day and generation that each man thinks the course he has pursued and is the most familiar with is the best; and thus earnest and honest contention keeps the gridiron of discussion red-hot, and the fellow who gets too near gets his hair singed, even in the dignified and scientific International Ophthalmological Congress. When will a blessed Moses arise to lead everybody out of the wilderness?

Then there was the lachrymal excretory duct slopping over at the most inopportune times, if not constantly, and hard by the man with his sixteen probes, from the size of a whisker to that of your middle finger, and skulls to prove that the normal caliber of a civilized duct is exactly measured by the diameter of a lead pencil. Of course he cures everything that comes in his way. Then the gridiron sizzles anon, and another fellow affirms that he cures all of his cases with the style, easily; whereupon another member with much experience and a little sand confesses that he has run the gamut of all known methods and still fails occasionally, and relates that he had recently in a large clinic seen the lachrymal gland removed in several cases, and which were not very serious cases, either! Now, one can readily understand how this radical means might so astonish the refractory duct that it would promptly and forever dry up. Another practiced irrigation through a fenestrated tube and got results. And so here from the depths of the lachrymal duct the fair but helpless I. O. C. cries out for a Moses to lead her into a co-ordination of views that she may arrive dry-shod into the promised land and be forever at rest.

In the line of therapeutics three remedies were mentioned and dwelt upon. They were mercury, iodide of potassium, and arsenic. Of such is the kingdom of the congress ! One man of them all had discovered that arsenic is of service in cancerous affections of the lids, and brought a photograph to prove it ! But, really, with the exception of a paper on lid pressure as a possible cause of asthenopia, and a newish operation for ptosis, it may justly be said that nothing new was presented, and nothing doubtful satisfactorily settled by the researches that have been made since the meeting five years ago. Does this indicate, in view of the talent and the clinical material in the field, that oculists as a whole have very nearly compassed the practical possibilities of ophthalmic science and art ? Perish the thought !

## ELECTRICITY IN AURAL DISEASES.

BY HENRY C. HOUGHTON, M. D., OF NEW YORK.

In response to a request for a paper on the value of electricity in the treatment of diseases of the ear allow me to say that aural diseases offer nothing peculiar in regard to physiology. The same principles that guide in the general application of this marvelous therapeutic force must direct one in its special uses. If one knows these principles, and has a good degree of mechanical skill, there will be no difficulty in adapting instruments to meet the object in view. If one is not thoroughly versed in principles, he or she will make mischief in practice.

The action of a current of electricity in the ascending or descending direction, and the effects produced at the point of entrance to or exit from the body, determine the question of therapeutics. In any specific case the quality of current, either galvanic, faradic, static, or thermal, is simply one of dynamic force, or potency, if you please. He who says: "Electricity is electricity, and it matters little what form is used, or what instrument is used to evolve the force," stands but one degree above the one who says that electricity is a delusion and a snare, and any apparent curative result obtained by its use is purely mental. The time is past when one need waste powder on such an enemy.

The action of a current of electricity is radically different at the point of entrance from what it is at the point of exit. At the first point, the anode, the positive pole, the action is sedative; the circulation is from the part. Acids

and oxygen are found there. At the second point, the cathode, the negative pole, the action is stimulating and the circulation is toward the part. Alkalies and hydrogen are attracted to this pole.

With certain well-recognized exceptions to, or rather modifications of, the above statements, the rule of practice is the same for faradism. The general effect of a current of electricity induced (secondary) in a long, fine wire is very different from that induced in a short, thick wire, and the profession is struggling toward a clearer statement of the therapeutic value of currents produced by varying sizes and lengths of wires by which and in which the force is generated.

Strange as it may seem, there is nothing new under the sun. After a century of experience we are returning to an extensive use of static electricity, from which the profession was diverted by the discovery and application of the induced form by Michael Faraday on account of the simplicity and compact form of the apparatus by which the force was generated. Here also we may observe that we have much to learn, and, for one, I am free to confess that, as in the use of galvanism and faradism, my errors have been in the direction of excessive dosage.

Concerning thermal electricity, the writer has nothing to offer, being engaged in the study of the A B C's of the subject; but there is as much of value, if not more, in the sphere of therapeutics to be derived from the use of this form of electric energy as from either of the better known forms.

Having confessed ignorance, and claimed a very limited degree of knowledge, of this limitless subject, all I have to offer will be in the line of instrumentation.

At the outset of my experiments with galvanism difficulties presented themselves in the matter of instruments; the only ones manufactured served to diffuse rather than concentrate the current. It was customary to fill the external auditory canal with warm water, to introduce a speculum somewhat after the form of Kramer's antique and

unique instrument, to apply a sponge electrode to the occiput or mastoid process of the temporal bone and pass the amount of current generated by from five to fifty cells. Even by this crude manipulation effects were produced that were deemed little short of magic. It must be admitted that sometimes the effects disappeared as if by magic. The first step in the direction of better means was the use of an eustachian electrode, made for me under the direction of Mr. Bartlett, then of the Galvano-Faradic Manufacturing Company of this city. This consisted of an ordinary eustachian catheter, through which a wire passed, ending in a spherical tip at the small lumen, and secured by a thread and nut at the large end, in which a tip could be placed connecting with the rheophone and battery. In place of the speculum formerly used, an electrode was devised consisting of a central wire terminating in a small spherical point over which a sponge or charpie could be drawn and secured by a small piece of hard rubber tubing, varying in size according to the caliber of the external meatus. This, dipped in a weak saline solution, and introduced well into the auditory canal, concentrated the current without the annoyances and dangers of maceration of old scar tissue to which one is liable in the use of hot water. In cases where it was desired to apply the current so as to bring into the circuit the tissues of the lower pharynx and anterior and posterior muscular structures, a tongue spatula, with insulated shank, was connected with the ordinary electrode handle. In case it was desired to apply the current to the tissues of the hard palate, well back toward the palatine arch, a similar electrode was devised, differing from the spatula in having a platinum surface superiorly and a porcelain surface inferiorly, and bent at right angles to the stem, so that it could be pressed against the posterior part of the hard palate.

Through a period of twenty years any departure from these simple devices has been futile, and instruments constructed after the original plans are still in daily use. There should be connected with every cabinet or office

outfit some mechanical device by which the galvanic current can be reversed regularly and rapidly. No explanation is offered for the fact that, if an electrode be applied over the ganglia of the trifacial and over the mastoid process, or at the occiput, and the current commuted, a different effect is produced than is produced by a continuous application of the current in either direction over a period of successive minutes. It is simply in keeping with the physiological fact that, if a current is passed continuously in one direction, exhaustion follows stimulation. The same instruments, the same manipulation, may be used in the application of the faradic or the static current. The only comment to be offered is this: In the use of galvanism with the milliampèremeter we have exact dosage; with the faradic we only approximate the dosage; with the static also we only approximate dosage, unless we adopt some such converter as has been suggested by Dr. A. L. Ranney.

In conclusion, allow me to remark that it advantageth little to quote isolated cases. From the application of electricity in a large number of cases of disease of the middle ear I have been led to the conclusion that the results secured by faradization or by static electricity equal, if not surpass, those reached by galvanism. Certainly, in the restoration of muscular tonicity, and modification of the nutrition of the middle ear, it seems to me to be true, and in the modification of subjective noises faradism and static electricity have served me better than galvanism, with the disposition of mind to favor static electricity even above faradic.

## PRACTICAL SUGGESTIONS ON THE SUBJECT OF NOSEBLEED.

BY EDWIN A. PYLE, M. D., JERSEY CITY, N. J.

Practical experience is the only apology for introducing a subject so commonplace as nosebleed. It has been of such general interest to the practitioner, however, as to engage the attention of every author from the days of Hippocrates to the present time. And, aside from this attest of importance, it has been my experience to witness such a degree of incompetency in the profession to treat properly even the ordinary phases, and I have seen such unfortunate results follow, as to assure me that there is at least an excuse for narrating my personal observations. In recasting old subjects the opportunity is sometimes as great to confer blessings as in promulgating new and untried theories. I have often thought what a tale of woe might be unfolded were the various organs empowered with speech. How the stomach would cry out against the quackery of all Christendom! What would the liver have to say of its treatment by layman and physician! In making up man's economy it was wisely hidden from view; for had it been an exposed organ how would it have stood the gall of the world? The uterus has been the scapegoat of feminine ailments, and has received perhaps the most caustic attention of all the members of the body.

The rectum is just coming into prominence, and, with the amount of distension and squaring and shortening which the future has in store, bids fair to rival all comers. The nose has never been respected. Its functions have always

been traduced. In health it has taken all the irregularities of life, and in hemorrhage has accepted punishment but little less than what might come, with interest, straight from the shoulder. You will recall some early attempts to arrest epistaxis occurring in your own practice or in that of some fellow-physician. The patient is past middle life; the family has exhausted its resources; even the proverbial key, as suggested by a neighbor, has failed. The doctor with an air of confidence calls for cotton, which may be of the antiseptic variety, but most generally is of the commoner sort. His manner clearly portrays no well-conceived idea of the lesion, and, without making any attempt to illuminate the nares, he proceeds on the general principal of plugging a hole. He at once misjudges directions, and, with the forceps well armed with the aforesaid cotton, produces no little discomfiture by following up the axis of the nose, and lands in the middle chamber, invariably above the bleeding point. He now applies his armamentarium with great liberality until the nose balloons out of shape and the blood quietly circumnavigates into the other nostril. This one in turn now receives similar treatment until the organ bears resemblance to a stuffed section of a transverse colon. By this time the cotton plugs have become well filled with blood, which necessitates replacing them, with still larger ones, perhaps saturated with some newly arrived styptic to add to the confusion. The blood can no longer face such bold opposition and takes a back track down the throat. Now follows an obliteration of all past work by desultory syringing with some astringent solution, then follows more cotton and more blood, until finally the conclusion that nothing short of posterior plugging will save the patient. This most annoying procedure being accomplished after some display of instruments and much retching, the family looms up with new courage. The doctor departs, and the patient is left full of discomfort and not yet out of danger. Or, perchance, the case is still more trying. The hemorrhage may have been arrested, but the doctor is called at midnight to find his former efforts now unavailing. He

stanches the flow again, only to be recalled at his next busy office hour to find some brother physician pressed into the emergency, and the family alarmingly anxious to have "something done."

This is not an overdrawn picture of a too frequent experience, and I often wonder why a hemorrhage in this part of the body is not treated with the same light and wisdom that would be demanded elsewhere. Passing by hemorrhages that come from traumatism and morbid growths, I call your attention to the three varieties most common in general practice: 1st. Nosebleeds of the young. 2d. Nosebleeds of those past middle life. 3d. Nosebleeds of typho and of exanthematous fevers. Active congestion is the common cause of recurring hemorrhages in children before the age of puberty, and in these cases, so far as I have examined, there appears to be no appreciable lesion beyond a general vascularity of the erectile tissue, perhaps caused by the processes of development, by some slight deformity of the septum, or a general condition of catarrh. Passive congestion of the mucous membrane, due to a multiplicity of causes, is the chief source of hemorrhage in those more or less advanced in life. These are the most difficult to arrest, and unless properly treated will recur at variously provoking intervals.

In the fevers we may have either the active or the passive form, depending much upon the altered condition of the blood and the character of the heart's action. I call special attention to these three classes to emphasize the fact that the bleeding point is almost invariably just within the vestibule, on the cartilaginous part of the septum and near its junction with the floor of the lower chamber. I do not affirm that the lesion is always as just stated, but it has been my experience to so find it in ninety-five per cent. of my cases, and for ten years I have made special observations in this particular direction. It has been a matter of surprise that writers have not dwelt upon this truth with greater force. Robinson and Seiler make no mention of it. McBride and Bosworth call attention to it, but give it no prominence

in treatment, while Chiari of Vienna has found such a lesion in seventy cases out of eighty with only a passing notice in his treatment. Now, a knowledge of this fact at once simplifies the whole subject, and clearly points out the necessity of a method that should be pursued in all cases. I want to say right here that specialism has one strong feature which the general practitioner might do well to bear in mind and to pattern after; and that is in all departments it develops a skill in examination and a method of procedure which not only give light on the subject, but at once carry conviction and confidence to the patient.

No one can work intelligently in the dark; a head mirror should be used to illuminate the nostrils. In the absence of this instrument the strong sunlight or the direct rays of a lamp can be utilized to locate the hemorrhage. The mass of blood and clots should be wiped away, to apply, if at hand, a solution of cocaine, as this is the only remedy we possess that controls capillary contraction. Then with a probe with some cotton wound firmly around one end make firm pressure on the bleeding spot in order to form a deep clot. In a few minutes the hemorrhage will be completely arrested. Occasionally it becomes necessary to continue the pressure, which can be done to the best advantage by connecting a number of cotton pledgets with strong silk, saturated in some astringent solution and packed firmly in the nostril from the floor upward. When the recurrent variety is to be dealt with, at whatever time of life, but particularly in the aged, we should not fail to cauterize with solid nitrate of silver immediately after the arrest has been effected. Some recommend crystals of chromic acid, others the electrode, but my experience has not been happy with either. When the lesion is located posteriorly on the septum the same general line of treatment is to be followed out, but it is much more difficult to accomplish. When no direct pressure can be made, the best antiseptic method is to use a continuous antero-posterior packing of iodoform gauze, building up from the floor of the lower chamber.

But there are cases where it is not possible to locate the

bleeding point, and where it becomes necessary to rely upon accessory measures and general principles. Styptic and astringent solutions may be tried, but they are not to be recommended,—they form clots that are too superficial,—while iron mixed with blood makes a most baffling and disagreeable compound. Apply ice to the nose and to the spine; give hot nasal douches of boracic acid and water, temperature 90°, continued until it returns unstained. Treat the hemorrhage as would be done in any other part of the body: put the nose to absolute rest; allow no disturbance of clots by blowing, hawking, or breathing. Especially quiet the nervous system by remedies, and make full assurance that there is no danger.

Dr. Kohn of New York makes a good suggestion: to put the patient in an upright position and require him to breathe rapidly and deeply, “to act as a respiratory and cardiac stimulant to throw more blood into the pulmonary circulation by abstracting from the head.”

Should all these methods fail there remains a *dernier ressort* of post-nasal plugging, but I condemn this practice as antiquated and too generally advocated. Says Chandelier: “In my experience there are few if any cases requiring such an ultimatum.” It puts the patient in a deplorable condition, and the continued pressure sets up distressing pain. The locked-up secretions and the cotton by excluding oxygen produce recurring hemorrhages, and by becoming fetid subject the patient to the dangers of purulent rhino-pharyngitis, to otitis media suppurativa, and there are on record cases where erysipelas and gangrene of the face have followed.

Some few years ago I saw a much respected physician, old and experienced, use the post-nasal plug in a case of typhoid fever, without having tried any other method, and leave it *in situ* three days. The Bellocq canula was to him an indispensable instrument.

Mrs. M., a lady of literary distinction in our town, was seized with nasal hemorrhage, and in one week's time was subjected to the annoyance and dangers of antero-posterior

plugging, three times in both nostrils, and the attending physician was our oldest and best surgeon, who thought it unnecessary to throw a ray of light into her nares.

Quite recently one of our young surgeons was called to see Mr. A., age sixty-five years, with violent nasal hemorrhage, which continued at intervals for several days and nights. Antero-posterior packing was the method, and every organ of the body was carefully examined for the cause except the inside of the nose.

For repeated nosebleeds Mr. G. passed through five physicians' hands, the last one being Dr. C. of this town, who kept this patient on tinct. iodine for six months, followed by iodide of potassium for twelve months, and in all this time never recognized the small ulcer and general vascularity just within the vestibule.

Mrs. A., aged seventy, was seized with severe epistaxis at 11 P. M. Notwithstanding the multiplicity of cotton and syringe, iron and ice, all efforts proved unavailing until 4 A. M., when from some last suggestion or exsanguination the hemorrhage ceased. Subsequent examination revealed the bleeding point to be well up on the septum, and so anterior that the pressure of a clothespin on the cartilaginous parts of the nose would have arrested it without fail.

Mrs. D., aged sixty-three, had a severe nasal hemorrhage, apparently from both nostrils, that was arrested by her physician by anterior plugging four different times in forty-eight hours. I was summoned hastily at the fifth bleeding, to find the entire mucous surface relaxed and congested by the mechanical presence of the cotton retained secretions, and by the want of oxygen. I cleared out all clots and plugs, applied a solution of cocaine, afterward cauterized with nitrate of silver a small portion of both sides of the septum, left the nostrils free to breathe the air, and had no subsequent trouble.

The practice of stuffing the nares full of cotton to remain *in situ* more than a few hours is to be condemned, for the simple reason that it becomes loosened by the excessive secretions set up by its presence, and is then no more nor

less than a foreign body which will abort the very best intentions. Good antiseptic surgery demands that the nose shall be kept clear and clean, and only in a few instances are the cotton plugs necessary, and then only for a few hours, and never in my experience has it been necessary to use cotton both anteriorly and posteriorly. In those spontaneous cases in which there is no discernible lesion,—and those are mostly to be found in growing children,—the fluid extract of *hydrastis canadensis* in 10 gtt. doses is recommended by the German Poliklinik, as this remedy seems to give “tone” to mucous membranes. I have had better success in using it in a spray with water or alboline. Our own therapeutics on this subject are full of suggestive remedies, but I have not verified the experience of others, except in the use of such measures as are best calculated to build up the system generally. Under the heading of prevention all the general laws of hygiene should be considered.

To recapitulate: 1. Illuminate, to search for the hemorrhage as would be done in any other part of the body. 2. Keep always in mind the probable lesion. 3. Arrest by applying cocaine, followed by direct pressure of cotton on a probe. 4. In recurrent cases cauterize with nitrate of silver. 5. Avoid if possible all cotton plugs. 6. Never use posterior plug unless an absolute necessity.

## ELECTRICAL MASSAGE IN THE TREATMENT OF DISEASES OF THE EAR.

BY THOMAS L. SHEARER, M. B., C. M., BALTIMORE.

In taking up the subject of treatment of ear diseases by electrical massage it should be understood that the word electrical is here used simply to denote the fact that the motive power by which the various effects are produced upon the aural conducting apparatus is electricity, not that the current itself is transmitted to any part of the ear directly. It is also necessary to state that the kind of aural diseases treated by this method are those included under the class known as chronic. The special forms with which we meet in this group will be referred to later in this paper. Now ordinarily by massage we understand that some kind of manipulation through either simple or complicated movements of the hands is applied to a part of the human body with the idea generally of obtaining as a result one of the following objects:

1st. The removal of any rigidity of the region, and hence improved mobility of it.

2d. The absorption of any inflammatory local deposit.

3d. The improvement of the circulation of the part, and hence increased nutrition of it.

4th. The increase of muscular power of the part, and therefore, as a direct result, the better performance of its functions.

In some of the aural diseases which present themselves to us for treatment we find physical conditions which correspond to some or all of the points just enumerated.

Some writer has said very sensibly that it is a good rule for the laity never to put anything into the external auditory canal smaller than the human fist. Clearly according to this we must look to some other method of applying massage to the ear, and of late what is called vibratory motion has been suggested and tried. But before considering this let us examine into the kind of cases in which we should use mechanical vibratory motion, and endeavor also to ascertain whether it is a reliable therapeutic agent in these diseased conditions. First, then, it may be stated that of all cases of chronic deafness, with or without tinnitus aurium, with which we meet in practice the most common are of the type produced by non-suppurative inflammation of the middle ear. Under this heading we find as varieties :

*a.* Hypertrophy of the tissues of the middle ear.

*b.* Atrophy of the lining membrane of the eustachian tube with corresponding changes in the middle ear.

*c.* Exfoliation of the dermoid layer of the external auditory meatus and of the membrana tympani with secretion of very dry, hard cerumen.

*d.* A condition of more or less rigidity of the tissues with contraction of the tympanic membrane and altered secretion of wax, impairing the hearing. The primary cause of these latter changes has no doubt been an acute suppurative process which was recovered from sufficiently to close up the perforations in the drumhead (tiny scars being in some instances plainly discernible), and following cicatrization the changes in the parts occurred. With this a follicular pharyngitis is apt to be associated.

It is not necessary here to enter into the diagnosis between cases of deafness produced by the causes just mentioned and those in which the auditory nerve is diseased; neither is it essential to refer to adenoid growths of the pharyngeal vault, or to the points by which we rule out and distinguish these different causes of deafness, as they are treated of sufficiently in text-books which cover this special subject. The question before us is: Given the above-mentioned cases of deafness, what results have been obtained

with massage applied in the form of vibratory motion to the membrana tympani and its chain of ossicles? Also, under what conditions should we avoid its employment?

1st. It has been used where atrophic changes in the membrane lining the eustachian tube were very marked, with similar alterations in the drumhead, and where the air in the tube was consequently rarified. One frequently found with this condition of affairs that the annoying, persistent symptom tinnitus aurium was present, produced probably from contraction of the fibrous layer of the membrana tympani with secondary pressure through the ossicles, the stapes being forced too firmly into the foramen ovale, with undue pressure in the labyrinth.

2d. In general hypertrophy of the tissues of the middle ear.

3d. In cases which have resulted from old former acute suppurative processes.

4th. In cases of obscure tinnitus aurium.

Now in which of these cases ought we, on *a priori* grounds and from experience with the treatment, to expect improvement, and what, as a matter of fact, has the method done toward modifying the diseased aural conditions? In order to determine these points we must understand the theory of the treatment and its manner of application. The first instrument which I saw used for this purpose was that employed by Dr. Garey of Baltimore, its principle being the formation, by either slow or rapid vibrations of a metallic revolving substance, of a series of sound waves which varied in pitch and intensity. These waves were sent against the membrana tympani with sufficient power to cause in suitable cases vibrations of that membrane and its chain of little bones. The idea was that, if any rigidity of the parts existed, the persistent use of the vibrations would act as a species of massage and limber up the stiffened joints. The column of vibrating air was conveyed by a rubber tube, which was bifurcated in order to allow of its fitting accurately into each ear. The other end of this tube was attached to a rubber chamber, through the center

of which was placed a diaphragm, thus dividing the space into a lower and an upper section. It is now easy to see that any body of air set into vibration by the movements of the diaphragm would be readily transmitted along the tube to the ears. With this instrument I did not experiment because of the necessarily crude nature of its construction and because of its cost. A short time after the introduction of this apparatus I obtained another rather ingenious device called the Violin-Vibrophone, which, by the way, is made in New York. Its mechanism is very simple, is based upon the same fundamental principle as the previously described instrument, and allows one the slow, medium, and fast vibrations, as well as two imitations of the pathological sounds, viz., low buzzing and high singing notes. The main part of the vibrophone is simply the body of a violin, the power of which as a sounding board cannot be equaled. The strength of the current can be nicely regulated, and any reasonable amount of loudness or number of vibrations can be obtained. Its cost is only twenty-five dollars, and with three good Edison cells to drive it, it certainly works well. The dry cells which are furnished with it I did not find very satisfactory. With this vibrophone I have had considerable experience, and after a careful study of each case in which it was tried I have come to the following conclusions:

1st. It should, of course, never be used in acute inflammatory conditions about the ear or where marked pain is present.

2d. It is clearly an absurdity to expect any marked result from such massage where the pathological state is one of exfoliation of the dermoid layer of the external auditory meatus and the membrana tympani with even a slight amount of hardened cerumen.

3d. In people of very nervous temperament, and whose cases are principally examples of tinnitus aurium, it is well to remember that the too sudden impact of vibrations, when they are of the very coarse and loud variety, is capable of producing a marked degree of nervous shock. One young

lady who had undergone treatment for this symptom, with another instrument, however, exhibited all the signs of fully developed neurasthenia, and did not recover for some weeks after the two sittings which she had had.

4th. In old cases of tinnitus aurium of long duration the noises were temporarily drowned by the louder sounds produced by the instrument when they, in some instances, equaled those described in Dante's "*Inferno*," but after the patient recovered his ideas about things the original sounds went on as before. In other words, while some people who suffered from these annoying symptoms were benefited considerably, others, whose cases were of an apparently similar nature, failed to improve under the treatment. I am inclined to think that the real cause of a failure to relieve such troubles arises from the fact that we do not, in many sufferers, appreciate the actual nature of the tinnitus. Its causation is obscure, and very often we must depend entirely upon a description given by the patient, many of whom, even when well educated and intelligent, are not capable of conveying any approximate idea to the physician when it comes to the simple enumeration of their symptoms.]

5th. Treatment should always be begun with sittings of say ten minutes divided up in this way: two minutes with the slowest vibrations, three minutes with the medium and five minutes with the fast vibrations. But in every case one must test very cautiously the susceptibility of the patient, and proceed slowly until such modifications in the application of the massage as may be necessary are made and careful notes entered in a book for future ready reference. By doing this one avoids any risk of injury either to the auditory nerve or to the delicate intra-aural structures. It is also necessary not to prolong the massage in most cases over say twenty minutes, as it is rather inclined to do harm and produce a feeling of nervous exhaustion, the result of having the prolonged succession of tiny shocks carried so rapidly to the auditory center.

6th. In suitable cases the feeling after a treatment is de-

scribed by the patient as a sensation of air having been blown through the head from ear to ear—an open condition of the parts.

7th. The best results are obtained where a moderate catarrhal condition of the eustachian tube exists with a sensation of marked stuffiness, and where the use of the Pollitzer air bag does not relieve.

8th. Where very long-standing hypertrophy or very marked atrophy of the parts was found to be present no results of any decided character were obtained.

9th. In people whose ears were the seat of only moderate hypertrophy, with consequent partial rigidity of the membrano-ossicular structures, the general effects of the treatments were very encouraging, and certainly ought to urge us to the construction of instruments for still better methods of treatment. The theory which underlies the application of massage to these inaccessible parts is in all likelihood correct to a great extent, but we require better means for the practical use of it.

The instruments look well in one's office, they impress very greatly that portion of every medical man's clientele which revels in the enjoyment of novel and unusual sensations; and while the facts mentioned in this paper would be an additional reason for investing in a violin-vibrophone, yet I must caution anyone against promising his patients who may wish to undergo the treatment any particularly brilliant result before a few test applications of the massage have been given.

I regret to say that, with all the advances made in the province of aural diseases, for some time to come we shall be compelled to realize the fact that odontophones, metallic ear trumpets, and all kinds of serpentine portable speaking tubes are still very fashionable.

## CHRONIC DEAFNESS RELIEVED BY NASAL OPERATION.

BY H. F. FISHER, M. D., NASHVILLE, TENN.

CASE : Mrs. M. M., æt. thirty-two, brunette, nervous temperament, no children, general health good, presented herself for treatment May 8, 1893, complaining of partial deafness which interfered greatly with what would otherwise prove pleasant social relations.

Her mother has been deaf for the past thirty years, while a brother and a sister are so deaf that they can only hear very loud conversation when it is directed to them especially. Mrs. M. is under the impression that her trouble is hereditary, and says that it has been steadily increasing during the past thirteen years. She can interpret conversation which is directed to her, if the voice of the speaker is raised and she is in a position to see the movements of the lips, but, as she says, "then more than half is guess-work." There is no history of an attack of acute catarrhal inflammation, and she declares that she never even suffered from earache. Two years ago she had an attack of furuncles. She takes cold very easily, which usually manifests itself in a "sore throat." Her hearing is much better in a noise, and she has an annoying tinnitus which, in the right ear, she likens to a railroad train crossing a bridge ; in the left, to the noise produced by crickets, alternating with a roaring, rumbling sound.

On testing the hearing, she was unable to hear the watch with either ear, while the tuning-fork (middle C) showed bone conduction to be better than ærial, it being heard over the mastoid, on the right side twelve seconds, and on the left side nine seconds, after it was lost through the air. The right was worse for the spoken voice. After inflation with chloroform vapor by

means of the Politzer air-bag, there was manifest improvement both for the voice and tuning-fork.

Examination showed the external auditory canals to be of medium size, straight, and devoid of cerumen; *Mtt.* sclerosed and sunken, with the light spot displaced forward, the manubrium foreshortened, and the short process prominent (more so in the right ear); eustachian tubes closed, but inflatable by means of chloroform vapor, pharyngeal orifices of tubes and surrounding tissues hypertrophied, but no adenoid vegetations or granulations; pharynx, naso-pharynx, and nares in a chronic catarrhal condition, the tissues being thickened and hypertrophied; the middle turbinated, on the right side, reached to the floor of the naris, while its fellow of the left side lacked but little of doing so; the inferior turbinates were hypertrophied, crowding the middle turbinateds against the septum. Her speech was thick, with a decided nasal twang. It is hardly necessary to add that she was a "mouth breather."

Treatment was commenced June 8. Internally, she received graphites 6x before meals and on retiring; locally, saline antiseptic sprays were used for cleansing the nares and naso-pharynx, after which Lugol's solution was applied by means of the brush. This local treatment was followed by inflation with the Politzer air-bag. On July 1 the treatment was supplemented by the use of the vibrometer, the center attachment being used from three to five minutes: the first string with clamp at A2 for the same length of time for the left ear, while the right ear was treated with the fourth string open, the felt being placed at A2 to obtain the effect of a fire engine pumping, for the same length of time. July 11, hears conversation much better; no improvement of tinnitus or of hearing for other sounds. Treatment discontinued until November 22; on August 26 she caught a severe cold, which reduced her hearing somewhat, but did not affect her throat. The same local treatment, excepting the vibrometer, together with the indicated remedies internally, relieved the cold and improved the hearing within a week. November 22 she returned with another severe cold, and the hearing very much worse than when she discontinued treatment in July. The vibrometer was used daily, as before, except that the center attachment and the strings were used fifteen minutes each. Four applications of chromic acid were made to the inferior turbinateds prior to December 20.

After December 6 she received one treatment a week until January 8, 1894, at which time she discontinued treatment, having become discouraged. I advised removal of both middle turbinates, and on January 24 she gave her consent, provided that no improvement resulted after two more weeks' trial of the previous treatment. The use of the vibrometer was then increased to thirty minutes for both center attachment and strings, to which was added the galvanic current from one to five cells,—all she could bear,—the positive pole being placed against the *Mt.*, the negative in the nares or naso-pharynx, for fifteen minutes daily. The effect upon the hearing was beneficial immediately after each treatment, but passed off very quickly, so that at the expiration of a half an hour the hearing was no better than before the treatment. On February 15 I removed all the right middle turbinated with the scissors. The operation was followed by considerable shock, some hemorrhage, and a great deal of oozing for several days, owing to the weak styptic employed. The following day she "heard the watch tick in the right ear for the first time in over ten years." On February 21, H. D., right,  $\frac{3\frac{1}{2}}{100}$ . February 25, H. D., right,  $\frac{5\frac{1}{2}}{100}$ . The following remedies were used, as they appeared to be indicated: graphites 6x, kali bich. 3x, hydrastis can. 3x, kali mur. 3x, sanguinaris can. 6x, and fagopyrum 1x, 2x, 3x. February 28, H. D., right,  $\frac{5\frac{1}{2}}{100}$ . V. much improved, but tininitus no better. She then went home to recuperate, returning on March 15 to have the left middle turbinated removed. H. D., right,  $\frac{4\frac{0}{100}}$ ; left,  $\frac{0}{100}$ . I explained to her that she could not expect such a brilliant result in the hearing of the left ear, but she insisted upon the operation, and on March 25, having delayed on account of very cold weather, I removed the left turbinated. The shock was but slight, there being but slight hemorrhage and no subsequent oozing, a weak Monsell's solution having been used. March 28, H. D., right  $\frac{3\frac{6}{100}}$ , due to the irritation attendant upon the operation (?); left,  $\frac{3\frac{1}{2}}{100}$ . On March 30 I allowed her to return home, at her request, and June 1 she wrote me that the hearing has remained about the same, but that she has again entered the social world and is deriving much pleasure therefrom.

I consider the good results due to the operations, the vibrometer having been given a faithful trial without improvement. Other cases which have not improved after a fair trial—twenty-

five to thirty successive treatments—with the vibrometer, have improved after an operation upon the turbinate bodies or upon the septum. It is true she improved somewhat prior to July 11, without an operation, but this improvement was lost before November 22, and could not be regained, or at least was not, until after the operation. I now refuse to treat patients with the vibrometer unless they agree to take at least fifteen successive treatments before giving it up, but thus far I have had only one good result, without operation, in the serious cases, *i. e.*, those of long standing.

## THE TREATMENT OF REFRACTIVE AND MUSCULAR ANOMALIES.

BY CHARLES DEADY, M. D.

In the section of Ophthalmology at the meeting of the American Institute of Homeopathy held at Denver, certain propositions were advanced which seem worthy of discussion. The first statement to which we wish to call attention is that the use of a mydriatic is frequently unnecessary in making examinations of the refraction of the eye.

We do not speak of this opinion as being new or as being confined to the gentlemen who there expressed it, but we do question the advisability of such methods of examination because of the inaccurate results thereby obtained.

It is of course impossible, in some cases, to use a cycloplegic, because the consent of the patient may be refused, and here we are obliged to do as best we may without it; but if the patient be informed that there is no certainty of a correct result except by its use, a very large majority will yield the point.

It has been said that the use of mydriatics was a method of satisfying the curiosity of the oculist at the expense of the patient, and if the only object in view is to relieve the presenting condition temporarily, this may be to a certain extent true, but in our opinion the educated oculist should do more than this if he would elevate himself above the level of the so-called "professor" who makes a pretense of fitting glasses in the optician's "parlor." It should be our aim in every case to make a thorough and exhaustive

examination, in order that we may, if possible, effectually and permanently relieve the annoying symptoms.

The oculist who habitually uses mydriasis can hardly understand the number of cases in which plus spherical lenses are prescribed by some of his fellow physicians. It is the experience of the writer that in ninety-five per cent. of patients who complain of headache or asthenopic symptoms, a thorough examination, with the accommodation paralyzed, reveals the presence of a certain amount of astigmatism; and it has become a rarity in his practice to prescribe spherical lenses, except in cases of presbyopia. Even where astigmatism is manifest, a mydriatic will frequently reveal a certain amount which has been concealed, or what in many cases is equally important, a difference in the axis of the correcting glass. In the sensitive patient, the latter is a factor not to be despised.

We have in mind a case in which the difference of .25 D. of astigmatism in one eye, and of  $10^{\circ}$  change in the axis without altering the number of the glass in the other eye, made all the difference between absolute torment and perfect comfort. This patient had been prescribed for by a prominent oculist, on the conditions manifest, and was wearing + .25 D $^{\circ}$  axis  $90^{\circ}$  in both eyes, without relief. Examination without mydriasis confirmed the accuracy of the former prescription, but with the accommodation paralyzed, the right eye called for + .50 D $^{\circ}$  axis  $90^{\circ}$ , the left required + .25 D $^{\circ}$  axis  $100^{\circ}$ , and with this combination the symptoms were relieved.

We do not recommend the use of a cycloplegic as a means of determining the total amount of hyperopia, as we habitually prescribe cylinders alone in cases of plus astigmatism, unless manifest hyperopia be present; the only exception to this rule being in cases where considerable esophoria exists. Our purpose rather is to ascertain the exact degree of astigmatism, and the precise axis at which the cylinders should be placed.

It is commonly regarded as unnecessary, and unadvisable, to paralyze the accommodation in patients over thirty-

five years of age. In this connection we desire to call attention to a statement made by Dr. Risley in a discussion appearing in the *Ophthalmic Record* of March, 1894, p. 367. He says :

“The pin-point pupils of people at fifty years of age, reading without glasses or with too weak glasses, demonstrated still further the existence of eye-strain, and hence the frequent need of cycloplegics after forty years of age. I have had no symptom of the glaucoma ghost which has been held up before us, from the use of mydriatics in middle life. I have used them in thousands of persons beyond the mydriatic dead-line, and no harm has ever followed. It would of course be folly to use them in cases where glaucoma was imminent, or in suspicious cases.”

This statement is borne out in our own experience in many cases. In all patients of this class, where circumstances seemed to require it, we have not hesitated to use a mydriatic, of course after careful examination of the eye, and have never seen a single bad result. It is proper to state, however, that atropine has been rarely used in such cases in late years, hyoscyamine, and later scopolamine, being the drugs so employed. The necessity of correcting even the smallest degrees of ametropia, where annoying symptoms exist, was pointed out years ago by the late Dr. George S. Norton, and his conclusions have been fully warranted by our experience. We have many times relieved chronic headaches by prescribing lenses as weak as .25 D. not only in astigmatism but in myopia.

In astigmatism it is our experience that, if anything, greater disturbance is caused by low degrees (less than 1. D.) than in higher degrees. This may be due to the fact that the lesser error may be overcome more readily by an unconscious effort of the patient, while the greater error is not susceptible of amelioration by this means. As a consequence he becomes contented with a lesser degree of visual acuity, and the effects of strain are not so prominently manifested.

The second statement that we desire to combat is, that

when glasses have been prescribed and the symptoms have been thereby relieved, the glasses may be thrown off. If a case presents with headache or other disagreeable symptoms, and we find upon examination that a refractive anomaly exists, we prescribe the correcting glass. Why? Because we expect, by approximating the eye as nearly as possible to the normal, that we will relieve the disturbance excited by its naturally defective condition. That the symptoms will be relieved by such treatment we confidently hope; that they will return after a certain length of time, if we withdraw the means of correction, would seem to be a natural consequence. If a certain degree of refractive error be sufficient to produce asthenopic symptoms, at a certain age, it would seem a rational proposition that if the means of relief be withdrawn, the same error at a later period, when the eye has been subjected to further wear and tear, should reproduce the same effects. We have frequently seen this result follow where patients have ceased wearing glasses of their own volition, and have often been obliged to correct muscular insufficiencies resulting from a repetition of the strain.

At the meeting first referred to, the statement was made that atropine was the best mydriatic for this use. At the risk of criticism from many prominent oculists we desire to take exception to this statement for the following reasons: First, that in no case can we be certain of absolute paralysis of the accommodation by the use of atropine, unless such use be persisted in for at least three days, and it will frequently happen that even this period will be much too short. During all this time, before the examination can be made, the patient is subjected to all the disagreeable consequences of mydriasis. Second, that the repetition of the use of the drug in a large number of cases produces symptoms of poisoning which, while they may rarely be dangerous, are exceedingly uncomfortable. That this condition occurs more especially in youth, when the use of a mydriatic is most frequently indicated. Third, that of all the drugs used for this purpose atropine has appeared to be the

one most likely to produce glaucomatous symptoms, and is therefore the one most dangerous to that class of patients approaching the border-line in years, or to those having glaucomatous tendencies. Fourth, that patients subjected to the influence of atropine probably require a longer time for recovery than from any other drug. We have seen one case in which its action lasted continuously for six weeks, and it commonly happens that patients require from seven to ten days for recovery. In this connection we quote from an article by Dr. N. L. MacBride, on the hydrobromide of hyoscyamine, published in the Transactions of the Homeopathic Medical Society of the State of New York for 1890, p. 323.

After giving the results of a series of experiments with hyoscyamine, not only in ordinary cases, but in those where a high degree of spasm of the accommodation was present, the thorough use of atropine having followed that of the first named drug in every case with certainly no more effective result, the author says :

“I might go on relating cases indefinitely, but they would only be a repetition, with a few slight changes in the time symptoms appeared and passed off. From a study of all the cases the following facts have been deduced: A solution of hydrobromide of hyoscyamine of the strength of one per cent. acts as a powerful agent in paralyzing the ciliary muscle when in a state of spasm. That a single instillation is enough. That paralysis is complete in from eighteen to twenty minutes. That the effects pass off in from three to five days. It gives rise to no disagreeable symptoms in children and young adults, and with careful use is safe even in the old, where of course it would seldom if ever be required to be used for spasm of the accommodation.” To this we would add that, after a long use of this drug, we are fully able to corroborate the statements of Dr. MacBride, and to say further that in almost all cases a solution of one to two hundred, or one-half the strength used in the original experiments, if allowed to act for one hour after a single instillation, is equally effective, and rarely produces any discomfort.

Of late we have been using with satisfaction a one-half of one per cent. solution of the hydrobromate of scopolamine. With this drug Dr. Pooley experimented some six months before publishing his results.\* He used a solution of scopolamine hydrochlorate of the strength of one-fifth of one per cent. He states that in every instance complete paralysis of the accommodation was produced after three or four instillations during the period of one hour, and the duration of its effect was from twenty-four to forty-eight hours.

Dr. F. G. Ritchie, in an article on the same subject,† gives the results of the use of a solution of one-half of one per cent. of the hydrobromate of scopolamine in thirty cases of refractive error. He states: "In a number of cases I used repeated instillations of the drug three times a day 'or three days; and in still other cases I tested the parties again under the influence of atropine and hyoscyne hydrobromate. In all these cases, with one exception, the tests did not vary from those made under a single instillation of scopolamine." He states his result as follows: The action of the drug became apparent upon the pupil in from ten to twelve minutes. The accommodation became affected a minute or two later. Paralysis of accommodation was complete in from twenty to twenty-five minutes, and lasted from forty-eight to seventy-two hours. The maximum time of action on the pupil was six days; the minimum, three days.

In our experience in the use of hyoscyamine and scopolamine we have never seen a tithe of the annoying symptoms which are common when atropine is the drug used. It is claimed that they have less tendency to produce glaucoma; the patient suffers no inconvenience until within one hour of the time of examination, and recovers from either in much less time than where atropine is used; the two first named drugs are equally, if not more, efficient.

Respecting homatropine and the combination of homa-

\**Am. Jour. of Ophthalmology*, March, 1894.

† *JOUR. OF OPHTHALMOLOGY, OTOTOLOGY, AND LARYNGOLOGY*, July, 1894.

tropine and cocaine, we would say of the former that we have no confidence in its results in ordinary solutions, and of the latter combination that it has been known to produce more serious symptoms for equal amounts used than any of the other drugs mentioned.

Dr. Coleman of Chicago, in the *Annals of Ophthalmology and Otology* for January, gives the results obtained in forty-one eyes after repeated tests of the refraction with disks of homatropine and cocaine, and finds that in twenty-two instances the error was greater after the second test. Comparing these results with those found under atropine, the fact was revealed that in  $87\frac{1}{2}$  per cent. of the cases the disks had failed to show the true state of refraction.

One other point before we have done, respecting the use of prisms for gymnastic exercise in muscular insufficiency. Taking it for granted that the proper glass has been prescribed, and the muscular conditions have been tested under a correction of the refractive error, and it becomes necessary to exercise the weakened muscles, is it good practice to order a series of prisms and allow the patient to take such exercise at home? We must return a negative answer to this question. First, because the large majority of patients will not perform such exercise properly except under the eye of the physician. Second, unless the patient can be seen frequently, there is danger in many cases that the point of equilibrium will be reached and passed without the physician's knowledge, and a deviation of the opposing muscles result. There can be in the nature of things no stated time in which a given set of weakened muscles can be trained to the normal. The results of exercise vary largely in different patients, according to age, temperament, and the method of performing the work. This being the case, there should be no risk taken in a matter of such moment, and we much prefer to test the condition of the muscles at each sitting.

## OPHTHALMOLOGICAL NOTES.

BIBLIOGRAPHICAL ANALYSES, BOOKS AND THESES, MEDICAL  
MISCELLANY, CURRENT NEWS.

VON HIPPEL has performed Fukala's operation for myopia in twelve cases. He executes discission, then extraction of the cortical masses without iridectomy, finally capsular section. The sequelæ have never been unfortunate under these precautions. Amelioration of visual acuity has been on the average from  $\frac{1}{10}$  to  $\frac{2}{10}$ , and once to  $\frac{7}{10}$ .

Schirmer used the same operation in two cases. Vision increased in one case from  $\frac{1}{20}$  to  $\frac{5}{20}$ ; in the other case the increase of visual acuity was from  $\frac{1}{3}$  up to  $\frac{2}{3}$  with proper correcting glasses.

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ELSCHING has seen two cases of obliteration of the large nutritive arteries of the eye which remained without apparent influence on the visual organ. In the first case the origin of the left primary carotid was obliterated in consequence of a chronic endarteritis. Besides, the left primary carotid and the left internal carotid were thrombosed as far as the origin of the ophthalmic artery. The origin of the ophthalmic artery itself was partially obstructed by an embolism.

In the second patient there was a complete thrombosis of the left internal carotid and of the origin of the ophthalmic artery.

In both cases the visual organ presented no anomaly.

To account for the collateral circulation the author injected the external carotid of the cadaver. By a canula fixed in the left external carotid one can inject, with a pressure of sixty centimeters of water, the vessels of both orbits, the tissues of the face, as well as the central vessels of both retinæ and the ciliary vessels, while injection in the internal carotid colors only one-half of the

face. By the external carotid one can inject both eyes after having cut and ligated the ophthalmic artery.

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IN Burchardt's clinic in the Charity Hospital of Berlin, chlorine water is used as an antiseptic before and after operations on the eye. The cotton dressing is also moistened with chlorine water. In place of fixing the cotton dressing with a bandage it is made to adhere to the skin by using collodion (100 parts of collodion to 3 parts of essence of turpentine). The same mixture is painted over the whole ocular dressing.

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TSCHERNING enumerates the changes observed during accommodation ; they are :

*a. Optical Changes.*

1. The ocular refraction increases.
2. The spherical aberration of the eye diminishes or is corrected.

*b. Changes of the Crystalline.*

3. The anterior surface of the lens increases strongly in curvature (at the summit).
4. The increase in curvature of the anterior surface diminishes toward the periphery.
5. The curvature of the posterior surface of the crystalline increases a little (at the summit).
6. The central part of the crystalline increases a little in thickness.

7. In certain cases the lens moves backward a little.

8. In certain cases the lens undergoes a slight descent when the accommodation attains its maximum.

9. The diameter of the lens seems to diminish a little and its edge to enlarge.

*c. Changes of the Uvea.*

10. The pupil contracts, and the contraction begins a little after the changes of the lens.

11. The iris changes its level. While the peripheral and central parts remain in their places, the middle portion undergoes a slight depression. Sometimes the central parts advance.

12. The ciliary processes advance slightly toward the axis of the eye.

13. The choroid is drawn forward.

*d. Changes of Ocular Tension.*

14. Tension diminishes in the anterior chamber.

All these phenomena are explained if we admit the author's proposition :

Accommodation is made by the contraction of the ciliary muscle, which produces a double effect. The anterior extremity of the deep layer retreats, and thus exerts a traction outward and backward on the zonule. This traction tends, on the one hand, to draw back the lens ; on the other, to change the form of its surfaces and render the central parts more convex. The posterior extremity of all the muscle advances and draws tense the choroid in such a way that it sustains the vitreous and prevents the retreat of the lens. By fixing the crystalline this last action favors the effect of the zonular action on the form of the surfaces.

This mechanism, which perfectly explains the changes observed during accommodation, is rendered more probable by the arguments drawn from comparative anatomy (accommodative apparatus of fishes).

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BOREL of Neufchatel says ocular hystero-traumatism often remain unrecognized, and are more frequent than statistics would lead us to believe.

Erythroptosis, hemierythroptosis, spastic astigmatism, monocular diplopia, nystagmus, mydriasis, epiphora with facial hemihyperidrosis, oculo-glosso-labial hemispasm, may each exist isolatedly and constitute a mono-symptomatic form of traumatic hysteria.

The ocular hystero-traumatism belongs usually to grave forms of hysteria even in individuals who have never previously exhibited nervous symptoms ; this is especially the case in forms due to catastrophies (railway collisions, railway spine).

Hystero-traumatic strabismus is the same as the artificial strabismus produced by hypnotic suggestion.

A trifling ocular hystero-traumatism may give place to a generalized hysteria of long duration, even in a strong man.

These troubles may incapacitate for work for more than a year when the hysteria is mixed, and may be followed by loss of sexual sense, generalized trembling with divers contractures and sensorial anæsthesias, loss of sleep, appearance of spasmogenic zones, myopia, mydriasis, and photophobia of long duration.

Induced hysterical kopiopia produces the symptoms that follow, in the order of their increasing intensity :

a. *Micropsie*.

b. *Monocular diplopia* with bicolored images, becoming more and more separated and more and more clear.

c. *Erythroptia or hemierythroptia*.

d. *Amblyopia* which may become absolute *amaurosis*.

e. *Epiphora* or paresis of the cutaneous vasomotors of the face

f. *Hemihyperidrosis facialis*.

Mydriasis with paresis of the pupil may be produced, but it is not constant.

The external vasomotor phenomena, causes of epiphora and hemihyperidrosis, may gain the internal membranes of the eye and cause belief in an organic affection, especially in cases of internal hystero-ophthalmoplegia.

## BOOK REVIEWS.

ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES. A Yearly Report of the Progress of the General Sanitary Sciences throughout the World. Edited by CHARLES E. SAJOUS, M. D., and Seventy Associate Editors, Assisted by Over Two Hundred Corresponding Editors, Collaborators, and Correspondents. Illustrated with Chromo-Lithographs, Engravings, and Maps. Five Volumes. 1894. The F. A. Davis Co., Publishers, Philadelphia, New York, Chicago; London: F. J. Rebman.

The edition of this excellent work for 1894 is at hand, with 168 pages devoted to ophthalmology, 38 pages to otology, and 116 pages to the progress in the nose and throat specialty, a total of 422 pages concerning the departments covered by the JOURNAL.

Under the department of Embryology and Histology of the Eye Huth of Iserlohn reports a case of binocular congenital anophthalmos. The lids and cilia were perfectly developed, and there were well-formed conjunctival sacs.

Randolph of Baltimore notes the coexistence of incomplete iris development, glaucoma simplex, and zonular cataract in a man thirty-five years old. The iris was absent in the lower and outer five-eighths of its extent, with only a narrow rim above and to the inner side. Both optic nerves were excavated and tension was markedly increased in the right eye, in which the cupping was greatest. Both eyes were myopic.

Meyer of Paris has a case of double colobomatous lens in a boy of ten years. One colobomatous area occupied the infero-nasal, the other the infero-temporal segment. There were no other anomalies.

Dodge of Halifax has seen a congenital cataract in the right eye of a boy whose mother had nuclear cataract of the same side.

Bertin-Sans of Montpellier has studied the influence of age upon the value of the rays of curvature of the crystalline lens by means of the Helmholtz ophthalmometer. He found that the

rays of curvature of the two faces of the crystalline lens, accommodated for the punctum remotum, increased as the animal grew older, and states that the same condition doubtless exists in man. As the indices of the crystalline lens increase with age, the far point is brought nearer, this being offset by the consequent increase in the rays, which tends to make the punctum remotum recede. By these two antagonistic factors the far point is kept at a constant distance from the eye.

Charpentier of Nancy has found that every luminous excitation provokes a series of oscillations in the retina, of which the first negative phase is the more generally noticed. This arises one-sixtieth or one-seventieth of a second after the beginning of the excitation, so that the period of each complete oscillation is one-thirtieth to one-thirty-fifth of a second. The velocity is about seventy-two millimeters a second.

Maddox of Edinburgh claims that if light be reflected into the eye from the mirror of an ophthalmoscope held at a distance of about one foot, while the patient looks at the aperture in the mirror, the position of the light reflex on the cornea gives a fair idea of the size of the angle " $\alpha$ ," and also a means of noting the amount of eccentricity of the fovea, as the greater the distance of the reflected image from the center of the cornea the greater is the distance of the macula from the posterior pole of the eye, and probably the greater is the hypermetropia.

Herron reports a case in which recurrent attacks of sneezing disappeared after the correction of existing ametropia.

A comparison of tests of refraction under atropine with those made by the disks of homatropine and cocaine, as reported by Coleman, shows that in  $87\frac{1}{2}$  per cent. of the cases the disks failed to reveal the true state of refraction.

Galezowski of Paris cautions against the diagnosis of dislocated lachrymal glands, in elderly, obese persons, as tumors.

In a case of convergent strabismus, in which, owing to an injury, the fixing eye had to be enucleated, Johnson has seen the visual acuity of the remaining eye increase from counting fingers at six inches to  $\frac{20}{16}$  in three weeks' time.

Taylor claims that cocaine is superior to other mydriatics in the treatment of iritis. He uses it in an ointment of 25 to 100 parts of petrolatum. He claims that cocaine can be used for an indefinite time without bad results, and that it does good by con-

tracting the conjunctival blood vessels, thus limiting the absorption of the iris.

De Schweinitz has seen marked improvement follow the subconjunctival injection of corrosive sublimate in gonorrheal and syphilitic iritis.

Beaumont of Bath believes that the improvement which sometimes occurs in the progress of incipient cataract is due rather to a change in the index of refraction than to a clearing of the lens substance. Where the periphery of the lens shows numerous fine striæ, the prognosis is favorable for retaining good vision.

Schweigger of Berlin has removed the lens fifteen times in cases of high myopia with improvement in the ocular condition of the patient. He does not think that iridectomy is necessary, and he removes the swollen lens matter as soon as it causes irritation. Only those cases are fit for operation where the far point is situated at about seven centimeters from the eye.

Darier of Paris has cured a case of central choroiditis, in which vision was nearly lost, by the use of subconjunctival injections of bichloride of mercury.

Bellarminoff of St. Petersburg reports a case of retinitis pigmentosa complicated by glaucoma in a man aged forty years. The examination and history gave evidence that the retinitis preceded the glaucoma.

Macleod of Adelaide reports three cases of ocular disturbance from exposure to direct rays of the arc light. In the first case there were asthenopic symptoms with micropsia and metamorphopsia and reddish after-images. Visual acuity was markedly reduced. The fields of vision were concentrically contracted and presented positive central scotoma. The fundi were normal. In the second case the lids were swollen and painful, and the whole orbital region was red and mottled with dusky patches. The conjunctiva was chemotic and there was a free muco-purulent discharge. The epithelium of the cornea was desquamating. There were photophobia and blepharospasm. The third case presented subjective symptoms similar to the first, but the fundus showed hyperæmia of the disks, with massing of pigment and apparently minute hemorrhages in the macular region.

Despagnet of Paris reports a case of intense optic neuritis where the symptoms were immediately ameliorated by the extraction of a carious tooth. A periostitis was propagated to the orbit

at the optic foramen, where the nerve was compressed and its functions were interfered with. There was a paralysis of the iris and of the ciliary muscle, which the author thinks was reflex, due to a neuritis of the fifth nerve.

Lagrange of Bordeaux has cured a case of obstinate blepharospasm by stretching the nasal nerve of the same side.

Morton reports four cases of reflex ocular manifestation dependent upon disturbances of the sexual organs. The first was a persistent photophobia and lachrymation which was relieved by an operation for paraphimosis. The second was a case of diplopia dependent upon an adherent prepuce, and the third and fourth were cases of retinal hyperæsthesia and asthenopia resulting from masturbation.

Lockwood of London reports a case of gangrene of the auricles. The patches of gangrene were symmetrical; there was no history of frostbite, the disease showing in mild weather. The pupils were uneven and did not react well to light, suggesting atrophic nerve lesion.

The testimony in relation to the value of excision methods for the relief of the consequences of chronic catarrh of the middle ear is variable. Jack of Boston has increased his list of cases reported last year in which the stapes was removed, and so far the results are still favorable. Blake has found that operations are most successful without general anæsthesia and that he can reduce the strength of his solution of cocaine from twenty to two per cent. without prejudice to the operation. He also finds that cocainization can be accomplished by direct application from the meatus; the stapes can be removed from the niche and allowed to remain in the tympanum without injury, so long as its blood supply is secured. In one case there was a loss of labyrinthine fluid and resulting vertigo, which gradually disappeared after twenty-four hours. His results are not uniformly favorable, and he regards his series of cases as experimental. Sexton does not find sufficient results from the removal of the stapes alone.

Burnett reports ten cases of operation for plastic catarrh. The drumhead and malleus were not removed in any of these; the incus was removed in all but one case; the stapes was removed intact in one case, was broken and the footplate left in the oval window in five cases; was not removed at all in four cases. There was decided improvement in hearing, and lessening or ces-

sation of all subjective symptoms in all except two of these cases. He draws the following conclusions :

1. The operation of partial removal of the drumhead (myringectomy of the posterior superior quadrant) is practically unattended by reaction.

2. Reaction not attending this modification of excision of the membrana, regeneration of the membrane is less liable to occur.

3. Removal of the malleus is not necessary for relief in cases of simple chronic catarrhal otitis media.

4. The removal of the incus alone, or of the incus and head and crura of the stapes, is followed by results as good as when the incus and the entire stapes are removed.

5. Displacement of the incus and leaving it in the drum-cavity, when the stapes is removed in part or in whole, is likely to be followed by inflammation of the middle ear.

6. The removal of the incus alone, the membrana, malleus, and stapes being left *in situ*, gives more space in the drum-cavity, increases its resonance, and permits freer access of sound-waves to the stapes, thereby improving the hearing.

7. The relief of tinnitus and aural vertigo is very probably due to the liberation of the stapes from the impacting weight of the incus, forced inward and held so by the retractive power of the membrana tympani and malleus.

Wolfenstein has treated about one hundred cases of acute otitis media by instillation of cocaine, five per cent. solution ; ninety-five per cent. have escaped suppuration. He instills five or six drops as often as the pain returns, closing the meatus with cotton. The pharyngeal inflammation must also be treated.

These comparatively few quotations from the immense number of reports upon all subjects in every department of medicine, serve to indicate the great value of this important annual contribution to medical literature, and to give some idea of the stupendous labor required in its compilation.

**MACROBIOTIC ; OR, OUR DISEASES AND OUR REMEDIES. FOR Practical Physicians and People of Culture. By JULIUS HENSEL, Physiological Chemist. Translated by Professor LOUIS H. TAFEL, from the Second Revised German Edition. Boericke & Tafel, Philadelphia.**

The theories in this work are new to English readers, and in many instances contrary to all our preconceived ideas on the sub-

ject; they are, however, presented in a thoroughly scientific manner and will furnish food for thought to the careful reader. The book is exceedingly interesting and stamps its author as a man of learning.

AN INTERNATIONAL SYSTEM OF ELECTRO-THERAPEUTICS: for students, general practitioners, and specialists. By HORATIO R. BIGELOW, M. D.; and Thirty-eight Associate Editors. Thoroughly illustrated. In one large Royal Octavo volume, 1160 pages, Extra Cloth, \$6.00 net; Sheep, \$7.00 net; Half-Russia, \$7.50 net. Philadelphia: The F. A. Davis Co., Publishers.

This work is a veritable encyclopedia of medical electricity; every department in medicine is fully represented, and each by an expert in the special line treated of.

The first three hundred pages are devoted to a history and description of the various forms of electrical energy—their methods of generation, nomenclature, and the special adaptation of each as a means of diagnosis or treatment, the physical principles involved, the methods of measurement and record. The different machines and appliances for practical purposes are described and the merits of each explained.

This is followed by essays on electro-physiology and electro-diagnosis.

The main portion of the volume discusses the uses of electricity in organic and functional disturbances throughout the body, its application in surgery with a history of the investigations of Apostoli and other prominent observers. This portion of the work is comprised under some twenty-seven heads, and the names of most of the contributors are a sufficient guarantee of the excellence of their work.

The book is a valuable contribution to the science of electro-therapeutics, and should be in the library of every physician interested in the subject.

LEE AND CLARK'S COUGH AND EXPECTORATION. A repertorial index of their symptoms. Second edition. By GEORGE H. CLARK, M. D. New York: A. L. Chatterton & Co., 1894. Full morocco, \$4, pp. 238.

The second edition of this excellent work comes to us in a new dress, handsome flexible morocco binding, good paper, and clear readable type. Numerous additions have been made to the text

as at first published, and the present volume is very complete. The value of these monographs to the practitioner can hardly be overestimated ; the concentration of thought and research in one direction has been the means of giving us many valuable works of reference, some of them of the highest type of excellence, and the present work is by no means the least of its class.

THE TRUTH ABOUT HOMEOPATHY. By Dr. W. H. HOLCOMBE. A Posthumous Manuscript. Also a sketch of the life of Dr. Holcombe. Philadelphia : Boericke & Tafel, 1894.

This is the last literary work done by the late Dr. Holcombe. It is written in answer to the "Browning Pamphlet," which was an essay entitled "Modern Homeopathy, its Absurdities and Inconsistencies," the prize winner in a competition for \$100, to be awarded to the best essay against the homeopathic theory and practice of medicine. Dr. Holcombe discusses the question in his usual vigorous style and thoroughly demolishes the arguments of his adversary.

The book is well worth reading as an able exposition of the subject, which fully answers many of the stock criticisms of the opposite school.

HOME TREATMENT FOR CATARRHS AND COLDS. By LEONARD A. DESSAR, M. D. New York : Home Series Publishing Co., 1894.

This little book of 120 pages is an effort to instruct the layman in the elements of the anatomy and physiology of the nose, throat, and ear, and to furnish directions for treatment of catarrhs and colds in emergencies. The descriptions of diseased conditions and the advice as to hygienic methods are good ; the treatment is entirely local as a rule, and from the old school standpoint.

## THE METROPOLITAN POST-GRADUATE SCHOOL OF MEDICINE.

At last homeopathy is to be represented among the post-graduate schools of New York City. It has long been a reproach to the homeopathic profession in this city that our graduates, when desirous of post-graduate instruction, should be compelled to go for it to institutions established by and under the control of our brethren of the other school. This condition of affairs will shortly be remedied by the new organization, which has a staff of about seventy physicians. All the departments of medicine and surgery will be represented by our ablest men and the courses will be thorough and complete. Arrangements have been made by which the large clinic of the Yorkville Homeopathic Dispensary, and that of the dispensary conducted by Professor T. F. Allen, will be turned over to the Metropolitan, and in addition to this the new school will, through the official connections of the various members of its staff, be able to draw upon every college and hospital under homeopathic control in New York for clinical material.

A laboratory for practical work in microscopy and bacteriology has been established and is under the control of experts in these departments.

It is the intention to teach the scientific application of the homeopathic remedy to the cure of disease in the most thorough and exhaustive manner, and the names of T. F. Allen, Arkell R. McMichael, St. Clair Smith, Martin Deschere, Geo. G. Shelton, W. A. Dewey, and Thomas M. Dillingham as professors of materia medica are a sufficient guarantee that this will be accomplished.

The trustees have secured the building No. 245 East Eighty-fourth Street, which is well adapted to the purpose in view, being newly fitted up, easily accessible by several lines of travel, includ-

ing two elevated railroads, and in the heart of a large tenement district isolated from other dispensaries.

The school will open November 15, 1894, for the reception of students, and as the dispensary department has been in working order all summer, there will be sufficient clinical material on hand for all purposes from the start.

The officers of the institution are : President, F. T. Allen, A. M., M. D., LL. D. ; Vice President, J. M. Schley, M. D. ; Dean, Arkell R. McMichael, A. M., M. D. ; Secretary, Charles Deady, M. D., O. et A. Chir. Announcements may be had by addressing the Secretary at 110 West Forty-eighth Street, New York.

